Electrical World

The consolidation of Electrical World, Electrical Engineer and American Electrician

Published by McGraw-Hill Company, Inc.

W. H. ONKEN, Jr., Editor — HAROLD V. BOZELL, Editor

EARL E. WHITEHORNE, Commercial Editor
ALLEN M. PERRY, Engineering Editor
L. W. W. MORROW, Associate Editor
J. C. MARTIN, Western Editor
ROBERT SIBLEY, Pacific Coast Editorial Director
H. S. KNOWLTON, New England Editor
ROBERT M. DAVIS, Statistical Editor
T. P. KINDIG, Associate Commercial Editor
H. M. CUNNINGTON, Trade and Markets Editor
R. L. SHEPHERD, Assistant Engineering Editor
H. C. ANDERSON, Assistant Western Editor
PAUL WOOTON, Washington Representative
F. C. WELLS, Associate News Editor

Volume 80 — New York, Saturday, August 12, 1922 — *Number* 7

The Passing of Alexander Graham Bell

ONE can realize the amazement of Dom Pedro, Emperor of Brazil, when in 1876 at the Philadelphia Centennial Exposition he heard a human voice through a telephone receiver and cried out, "My God! It speaks." Then the telephone was a novelty and the message was carried less than one hundred feet. Today the telephone is an indispensable adjunct of business and social life, and the human voice through its agency is now heard across the continent. What Alexander Graham Bell gave to the world on March 10, 1876, was a wire, a reed, a magnet and a clock spring—nothing like the telephone of today, but it was enough. "Salem witchcraft" paragraphers ignorantly dubbed it, little realizing that from the tiny attic in Boston had come one of the epoch-making achievements of history. Civilization freely acknowledged the debt it owed to the man whose brain conceived the telephone, so that Alexander Graham Bell was not without suitable honor or reward during his lifetime.

BUT while Bell was fertile in conception he lacked commercial shrewdness and business instinct. He had indeed planted the seed, but it remained for Theodore N. Vail to water and nourish the growing plant. It was Vail who visioned a telephone system, universal and comprehensive, made up of local units giving an immediate local service, interconnected and welded into a national, centralized and interdependent system. Although Professor Bell took up other work, he was content to remain the originator and pioneer of telephony. Selfishness or ingratitude was not in his make-up. "I may perhaps," he said, "take credit for having blazed the trail for others to come after me; but when I look at the phenomenal developments of the telephone and the great system that bears my name, I feel that the credit for those developments is due to others rather than to myself."

IT IS needless to trace the growth and influence of the telephone since its invention forty-six years ago. As Americans we can take pride in the knowledge that it was born here and that here it has reached its greatest perfection and its greatest use, for 65 per cent of the telephones of the world are in service in the United States. As we know the instrument today it is no more like the crude contrivance of Bell than the "Twentieth Century" locomotive is like the engine of Stephenson or the generating machinery of a great modern central station like the historic apparatus set up in New York City in 1882.

Thousands of engineers have contributed to the evolution of the telephone since the days of Bell and Watson. As we pause to do homage to the illustrious dead let us applaud also these workers in the field along which he blazed the first path. To do so detracts no iota from the debt civilization owes the pioneer. As Webster said of the state where Bell wrought his miracle so we may say of him: "There he is." His fame is secure.

Charles Day

A modernizing engineer, consultant and economist of nation-wide reputation, and a specialist in public utility management and operation.

IN CHARLES DAY the electrical industry has the services of a technical engineer of standing and also of an economist of high rank. He first gained prominence as an exponent of manufacturing efficiency in industrial plants and was largely influential in establishing present-day production methods and building designs.

Not content with this work, he extended his activities to the public utility field, where his grasp of the problems and his capacity for organizing a business on an economic basis rapidly established him in the front rank of utility engineers and executives.

Mr. Day is now a recognized authority on public service corporations and serves as an officer or director of a large number of public utilities while his firm is retained as consultant to important banking institutions.

During the war period Mr. Day served his country in many ways. He was active on the general munitions board and the depot board. He served with Charles Piez and Arthur Mason on a committee to report on shipyard conditions. In 1917 he accompanied Colonel House's mission to England and France as an engineering adviser and was made a member of the Army War Council upon his return to this country.

Also as a trustee of the United States Shipping Board Corporation he was very active in connection with matters pertaining to the transportation of troops and supplies and, during his absence abroad, collaborated with Dwight W. Morrow and other heads of the Inter-Allied Maritime Transport Council.

In July, 1918, he went to France, accompanying Edward R. Stettinius, to secure information concerning the adequacy of port facilities for the rapidly increasing fleet. While in France he had numerous opportunities to confer with General Pershing, General Atterbury and members of General Pershing's staff. He later joined Secretary of War Baker, who was accompanied by General Hines, chief of embarkation service. Mr. Day returned with Secretary Baker just prior to the signing of the Armistice.

Mr. Day was born in Philadelphia on May 15, 1879. He graduated from the University of Pennsylvania with the degree of bachelor of science in electrical engineering in 1899 and received the degree of mechanical engineer in 1903. In 1902 the firm of Dodge & Day was formed, and in 1907, when John E. Zimmerman entered the firm, the name was changed to that of Day & Zimmerman, Inc.

In his early professional life Mr. Day was engaged in industrial problems bearing on manufacturing efficiency, and so great was his success that he was invited to lecture on the subject at Lehigh, Columbia and Harvard universities. About fifteen years ago Mr. Day became interested in the public utility field and now devotes his energies largely to that work.

In addition to his professional work Mr. Day is a trustee of the University of Pennsylvania, a vice-president and director of the Williamson Free School of Mechanical Trades, and a director of the Philadelphia Trust Company. He is a member of several social clubs.

The contacts of Mr. Day with the public utility industry at large are far-reaching and embrace both the technical side and the financial. He enjoys an enviable reputation alike as executive, consultant and economist and his influence and reputation in the electical industry is constantly increasing.

Editorial Comment

Electrical World, August 12, 1922

Volume 80 Number 7

Increasing Hydro-Electric Station Capacities

THERE may be many hydro-electric stations in the country of which the capacity can be increased with as much gain and as little expense as in the case of the Kern Canyon station of the San Joaquin Light & Power Corporation. This station, as described elsewhere in this issue, has recently been increased in rating from 3,000 kw. to 12,000 kw., an enlargement made possible because there was sufficient water available to warrant the undertaking. The work was performed with the greatest economy through the enlargement of the existing tunnel, which in any event would have required extensive repairs costing almost as much.

The electrical features of the station are in line with the trend of development, which is characterized by greater simplicity in wiring and in operation. In common with many recently built stations, this one has no low-tension buses, thereby avoiding a source of possible trouble without decreasing the flexibility of the station materially. Another point of simplification is in the excitation system. No rheostat is provided for the generator field, and the generator voltage is varied by controlling the excitation of the exciter field, which is in turn excited by a separate control unit driven by an impulse wheel provided with an oil-pressure governor. This method of voltage control has been well tried in the past and has been found to be both effective and economical. The only automatic regulation of the voltage is that obtained through the use of a potential relay which operates on high generator voltage and cuts resistance into the circuit of the exciter field. Such an arrangement has been found to be necessary when operating hydro-electric stations of this kind in parallel with modern steam-turbine stations.

The Significance of the Coal Strike

HOW long is the intelligent public going to remain an easy mark for those who mine and furnish coal? The strike has dragged itself along, as similar strikes have done before, week after week and month after month. Its immediate ending could not undo the harm or repair the loss of the long strife. The row is of the kind in which gentlemen who are dependent on the electorate for their jobs are not overanxious to mix. The salient facts are that the public does not know what the coal miner earns, what his employer benevolently assimilates in the way of profits, and whether transportation for coal is actually to be had on the open basis of the railroads being common carriers. Until some authority has power to put the contending parties on oath and compel them to furnish full and precise information as to the facts, and until there is some power able to make both the railroads and their employees obey legally formulated decisions, there is not very much hope of an amicable, let alone a permanent, settlement of the difficulties.

The time is long past when the government should handle with gloves any of the parties concerned. The rights of the public are paramount. We note an increasing tendency just now to go in for oil-burning plants as a possible refuge from present evils. With respect to this we have abundant evidence of the efficiency and at least temporary economy of oil burning, but we advise any one contemplating a change of fuel on a large scale to sit down quietly and ask himself what power there is to control the price of oil any more effectively than the price of coal has been controlled in the last few years. The grim situation is that our present civilization has come to depend on transportation of fuel and other necessities to an extent never imagined before in the history of the world, to an extent in fact which quite upsets the older theorems of political economy. It is time for the public, which in the last resort is the governing power, to unsheath its claws and use them unsparingly on those who make its necessities their plaything.

How Can Convention Discussions Be Stimulated?

TOO many men have acquired the habit of attending conventions to listen to what other men have to say without contributing anything in return. No prompting or suggestions from the chairman will induce some of the audience to take part in the debate; but, after the formal discussion is ended and the meeting has adjourned, the same tongue-tied individuals will be found in one group or another which has remained to compare practices or experiences, exchanging just the information which should be presented at the formal meeting and then made available through a stenographic report to persons not in attendance.

This criticism can be made of most meetings nowadays, but it is rendered particularly pertinent by the comments of engineers regarding the cable-joint symposium held at Niagara Falls during the recent convention of the American Institute of Electrical Engineers. Although the information which was presented at that symposium was excellent, it was contributed by only a few of those there. Some of these speakers kept back their best remarks until after the formal meeting, and a number of men who had not taken part in the formal discussion at all virtually had a private convention after the general meeting, when their remarks were lost to all except their immediate neighbors.

Apparently only a few companies or engineers have made any serious investigations of high-tension cable joints, for the reason that these joints are rather expensive, and the few that have made experiments have done so in connection with some particular design or joint which they are putting on the market. Conse-

quently, in their comments, the latter class refer only to data which would serve to commend their particular type of joint and in so doing probably omit considerable information of fundamental importance. The situation is somewhat complicated by patents, but these should not interfere with engineers discussing plainly such fundamental points, for example, as whether the cable-joint filling compound should be an oil, a grease or a solid at ordinary operating temperatures. It was such fundamental physical points, not connected with patents in any way, that engineers attending the meeting appeared so willing to hear discussed and so reluctant to talk about.

The problem of stimulating valuable discussion at conventions must be solved. Possibly greater success will be achieved if a list of speakers known to have important information is made before the meeting and each is asked a specific question. The audience, too, should be urged to ask questions. Every engineer who reads the papers to be presented at a convention or who hears the papers presented owes it to the electrical industry to contribute comments regarding details with which he is acquainted. We hope better discussions can be arranged for at all engineering conventions.

Unreasonable Opposition to Lighting Codes

FROM many viewpoints the drawing up of an industrial lighting code is a thankless task. Yet the existence of a recognized minimum standard of illumination means so much in safety and comfort that plant owners will do well to encourage the establishment of reasonable regulations along this line. The erroneous idea that burdensome expense goes with the use of such codes is held by too many intelligent manufacturers, judging from the testimony at a recent hearing.

It was stated by many witnesses that among many thousands of industrial plant accidents an insignificant proportion could be classified as eye injuries resulting from inadequate illumination. There is no question, however, that eyestrain results from poor illumination, and the gradual deterioration of vision arising from glare and poverty-stricken intensities on the working plane naturally does not get into the accident records of industrial hospitals and welfare departments. Others contended that millions of dollars would be required to install equipment capable of rendering service at code standards within a single state. A very little consideration disclosed the gross exaggeration of this idea, since it appeared to be based upon the total scrapping of all existing equipment and installation of the most costly material over every possible square foot of factory area.

Reasonable interpretation and enforcement of codes must be practiced if the best results are to be secured, and if this is done plant owners can wipe their slates of much needless worry. Exceptional cases occur in some industries where the illumination requirements are bound to be very different from the minima recommended, as in the manufacture of steel saws. A certain amount of glare appears useful here. One of the chief difficulties in the way of installing proper lighting is the opposition of the workers themselves, preference still being strong for localized unit lighting under the immediate personal control of the machine operator.

Publicly established lighting codes may not recommend the intensities justifiable in many cases from the production standpoint. The economic aspects may be left to the manufacturer or mercantile establishment proprietor. It is too well established now that intensified illumination contributes toward increased production to require much discussion. From the dual angle of employee welfare and production efficiency, proposed lighting codes should be considered by progressive users, and there is no place for unreasonable opposition to try-outs of codes worked up in good faith and by skilled engineers for the larger benefit of industry and business.

France Inaugurates Its Superpower System by Building a Modern Station

THE Gennevilliers station in Paris is the latest word in French power-plant design and, when compared with other French plants, represents a radical departure from existing practice. On the whole, we believe the electrical features of the plant are better than the mechanical. The omission of low-tension buses, the arrangement of the high-tension switching and the thoughtful design to eliminate hazards from fire meet our hearty approval. On the other hand, there is a complexity about the mechanical features of the plant that violates the code of simplicity so strongly advocated by American designers and makes one question the reliability of the design.

The coal-handling system uses bridge cranes, belt conveyors, bucket hoists, trolley cars and trolley hoppers. All these are interlinked in a rather complicated system—the trolley-operated hoppers for the boiler room are even controlled by block signals. In the use of two types of boilers, one equipped with chain grates and the other with underfeed stokers, another example of complexity is encountered. The use of air preheaters, forced-draft and induced-draft fans in multiple, gas filters and economizers is carried to an extreme that hardly seems warranted by fuel cost in France, which is comparable to that in New York. Also the stack used is questionable from a forcing standpoint and the location of the superheater is very unusual.

On the other hand, this plant has many features that other plants can adopt to advantage. In the first place, a steam pressure of 313 lb. and a temperature of 707 deg. F. show that the designers were not carried away by the ideas of those who advocate high steam pressures. Then the plant contains ten-stage impulse turbines with a guaranteed steam consumption of 9.46 lb. per kilowatt-hour at three-quarters load, which may be favorably compared with the seventeen-stage turbines of the Delaware station at Philadelphia, with 10.8 lb. per kilowatt-hour, and the twenty-stage turbines of the Fifty-ninth Street Interborough station at New York City, with 11.03 lb. The use of the smaller number of stages gives a very high thermal efficiency for the unit, but the mechanical efficiency is lower than that of some existing installations.

We are glad to see turbine bleeding used for feedwater heating, because it possesses inherent advantages from the thermal standpoint. Only mechanical difficulties have prevented the use of multipoint bleeding to a greater extent in this country.

Another remarkable departure in design is that this station uses about 44 per cent less condensing surface in the main units than, for example, the Delaware and Colfax plants in this country and still uses about the same volume of cooling water. This may have become

possible for two reasons—cooler circulating water in summer and the better heat transfer gained by designing the condenser tubes with a greater ratio of circumference to cross-section. Mechanical troubles in operation, however, have resulted in the use of larger tubes in American practice than are called for by theoretical design.

The designers of the plant are to be congratulated on giving France such a splendid station as the starting point in the plan for a superpower system, and American engineers will await operating results with a great deal of interest. This is particularly true of the performance of the electrical system, which distributes all the energy through 60,000-volt single-conductor underground cables.

Industry Loses a Leader in Death of Frueauff

FORTY-EIGHT years are a short span in the life of man. Centuries ago they would have meant little, and a man dying at that age would have closed his eyes on the very same world on which he opened them. Today events move rapidly, and in a period no longer mighty empires have run their course and crumbled Great industries have arisen which thirty years ago were unknown. We live in a busy age, an age of achievement and immense historic and industrial importance, and naturally our age has brought forth its great men. The electrical industry is able to boast of many who have achieved greatness in its ranks. One of these, Frank W. Frueauff, was laid to rest early this week in Woodlawn Cemetery, New York, mourned by many, and particularly by those with whom he was intimately associated during the past twenty years.

Frueauff was a worker who appreciated the opportunities which the electrical industry afforded. That he made the most of these his position as head of 144 companies and his great fortune amply demonstrate. And yet with all his riches and responsibilities Frueauff never changed in temperament or lost any part of his native affability. Whether as meter reader in Denver or as head of the Doherty organization in New York, he was ever and always the same—genial, kind and wholehearted—a man who made and kept friends. As an organizer he was signally successful. Doherty and Frueauff made a wonderful combination. Frueauff was quick to grasp and interpret the vision which Doherty saw, and it was Frueauff's job to provide the organization to do the work. His loss therefore must fall heavily upon Henry L. Doherty & Company. The electric light and power industry also suffers in the untimely death of one of its youngest and most resourceful leaders, but it glories in being able to point to Frank W. Frueauff as an example for all the young men of the industry. None can be more handicapped than he was, yet he fought, struggled and succeeded. He started at the bottom and with faith and determination reached the top while still a young man. Indeed, in association work Frueauff always aligned himself on the side of the young men. He was very far from the period when he would have been content to be arrayed with the "elder statesmen" of the electrical industry. Probably he never would have reached that period had his life been prolonged, as it might have been, through another generation; for his was the spirit of persisting and invincible youth—the spirit that animates the industry in which he found his fitting sphere.

Diesel Engines Offer Means of Improving Economy in Power Production

THE Diesel engine and its use should be considered seriously by power producers. There have been some marked improvements in the engine recently, affording a still further gain in thermodynamic efficiency. At all loads for comparable sizes the Diesel engine will produce a greater output of power per B.t.u. input than any other type of commercial heat engine.

In Europe the use of the engine is on the increase and units of 10,000 kw. are available. Bearing troubles have been eliminated, temperature effects are known, constructional features and auxiliary equipment have been improved, proper flywheel design and balancing permit of parallel operation—so that the engine has passed the experimental stage of development.

Against the high first cost and greater rate of depreciation for the Diesel must be placed its low fuel cost and its economy of space. If the whole steam-plant operating cost and operating trouble is considered, the Diesel plant-operating cost and operating trouble may be less. The installation and operation of the engine itself will involve greater cost and may require more attention than in the case of the turbine or steam engine, but the costs and troubles arising in the boiler room and with the auxiliaries of the steam plant may more than offset these conditions.

We do not consider valid the claims that fuel economy alone warrants the use of the Diesel. The data are difficult to obtain, but the general impression is that the ratio of fuel to total operating cost is now about the same in steam plants of smaller capacity as during the pre-war period. Overhead expense and wages have increased about as much as coal. Besides, the first cost of the Diesel has very materially increased since the war and fuel-oil prices are decidedly more unstable. The Diesel should be considered seriously, however, in rather small steam plants with a low load factor, because the standby charges are a minimum and the unit can be used to carry its economic load, with steam reserves and steam units for peak loads. It also has a field as a standby reserve for small water-power plants which have no other reserve and as a developer of business in districts of light load which will ultimately be served from transmission lines.

As a carrier of peak load and as reserve in steam plants that are fully loaded the Diesel engine often can be used to advantage. The inefficiency of forced steam-plant operation is obviated, and additions to steam-plant equipment can be delayed until the load grows in magnitude.

The whole situation must be considered with regard to all its tangible and intangible elements, and often costs alone will not be the deciding factor. Too frequently the engine is estimated only on the basis of balancing high first cost and high depreciation against high efficiency and low operating cost. An exact solution can be obtained only by considering all operating costs and economies and all operating convenience features for the specific situation.

Enterprising power producers should look into the use of the Diesel on its merits, and the general if somewhat vague sentiment among engineers against the use of large Diesel-type engines, despite foreign and some American experience with their use, should not prevent their development and proper employment in the power stations of the United States.

New Hydro-Electric Plant on Kern River

THIS $2,000,000 power house of the San Joaquin Light & Power Corporation at Kern River Canyon makes possible 12,000 hp. for the development of the San Joaquin Valley. The plant can be operated at either 50 or 60 cycles, depending on the power demands of the interconnected systems, and offered opportunity for unusual features of electric and hydraulic construction.

How a 3,000-Kw. Hydro-Electric Plant Was Rebuilt to Develop 9,000 Kw.

Necessity for Tunnel Repairs and Increase in Load Afforded Occasion for Enlargement — Unusual Construction Difficulties and Peculiar Features of Electrical Installation

By H. K. FOX and B. F. JACOBSEN
San Joaquin Light & Power Corporation

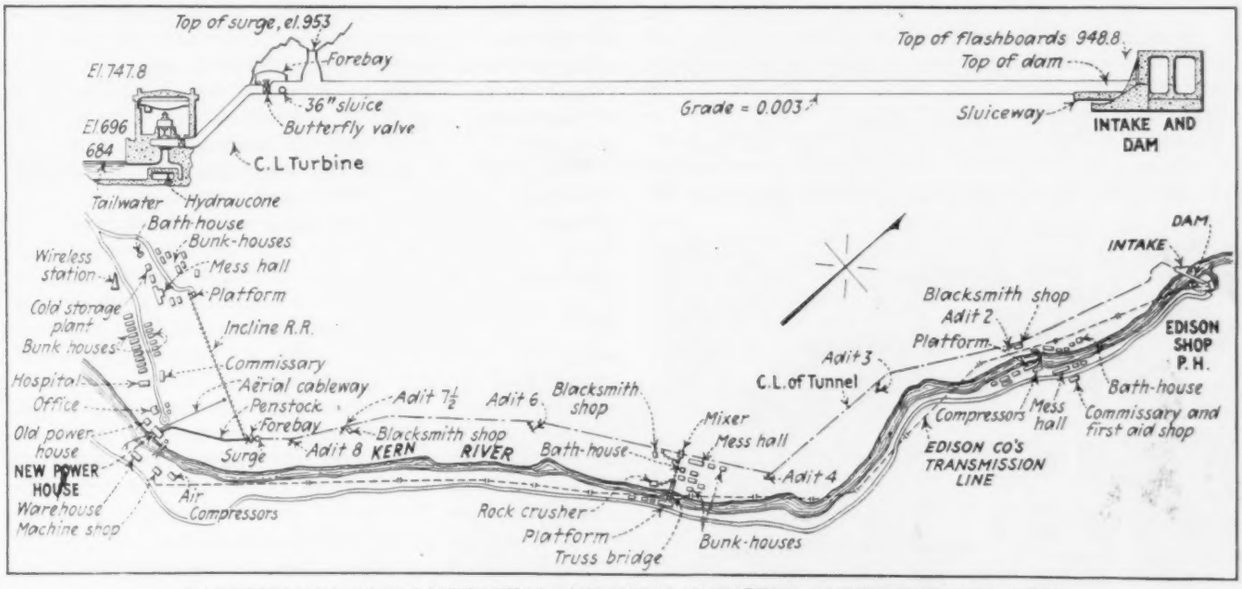
IN THE rehabilitation and enlargement of generating plants many problems arise which are common to all. Hence it is hoped that some engineers will be helped by the experience which the San Joaquin Light & Power Corporation had in rebuilding its Kern Canyon hydro-electric station, which is 18 miles northeast of Bakersfield, Cal.

This station was first operated in 1890 with two 400-kw. generators and enlarged in 1917 by the addition of a 3,000-kw. unit. As this did not utilize the full stream flow under the head of 230 ft. (70.1 m.), it was decided to enlarge the tunnel and build for an ultimate capacity of 13,500 kw.

design was made with the idea that eventually the old unit would be removed and an additional new unit of approximately the same size would then be installed in the new power house.

UNITS OPERATE AT 50 OR 60 CYCLES

The power house is situated about 2 miles (3.2 km.) from the Southern California Edison Company's station Kern River No. 1, and a 66,000-volt tie line between the two stations has been in use for several years. This tie line enables the San Joaquin Light & Power Corporation's station to be connected to the San Joaquin system, which operates at 60 cycles, or to the Southern



A CONSTRUCTION CAMP LAYOUT THAT FACILITATED COMPLETION OF REHABILITATION WORK

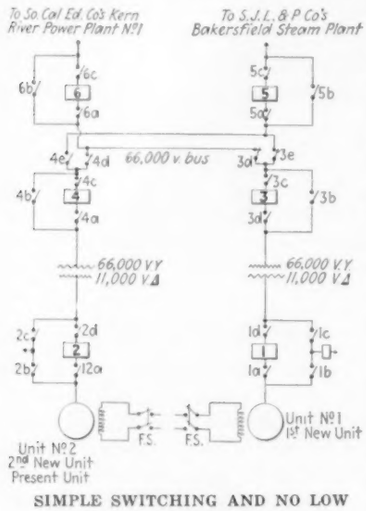
Considerable trouble had been experienced for some time with the 8,300 ft. (2,530 m.) of tunnel, and it became evident that extensive repairs of this tunnel would be necessary in the near future. Needed repairs to the tunnel had been delayed because of the fact that the plant could not be spared until the Kerckhoff station was completed in August, 1920.

In connection with the repair of the tunnel a study was made of the most economical reconstruction, and it was decided that the tunnel should be made large enough to carry a maximum of 800 sec.-ft. (22.4 cu.m. per second) and that an additional unit capable of utilizing 550 sec.-ft. (15.4 cu.m. per second) should be installed. The plant would therefore consist of the old 3,000-kw. unit in the old power house and the new 10,600-kva. unit in the new power house. The whole

California Edison Company's system, which operates at 50 cycles. The connection also makes it possible to connect one or more units in the Southern California Company's Kern River No. 1 station to the San Joaquin system by operating these units at 60 cycles.

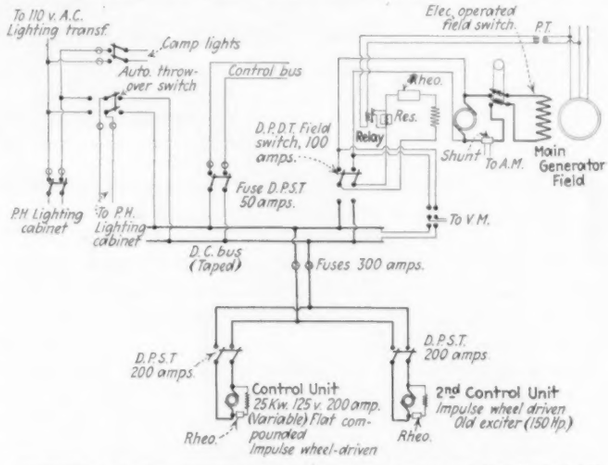
As it was desirable to retain this feature, it was decided that the new station should be so arranged that either unit could be operated independently in connection with either system or that both units could be operated together on either system. To appreciate this condition fully it should be added that the transmission line from this station goes directly to the San Joaquin Light & Power Corporation's steam station at Bakersfield and that this station also can be operated in all or part at 50 cycles and can therefore be used to supply the Southern California Edison Company.

As shown in the connection diagram, oil switches No. 5 and No. 6 are provided with standard overload reverse-power relays and the reverse power element is so connected that it will trip only for outgoing power. Therefore, if, for example, the Bakersfield steam station and the Kern Canyon station are supplying power to the Southern California Edison Company's system at their Kern River No. 1 station, a short circuit on the transmission line between Bakersfield and the San Joaquin Kern Canyon station would open only oil switch No. 5, and the San Joaquin Kern Canyon station would be disconnected from the short automatically and continue to supply the Southern California Edison system. When the Southern California Edison system and the San Joaquin system are not tied together through the San Joaquin's Kern Canyon station, the potential coil of the reverse-power relay is short-circuited to eliminate selective action and oil switches No. 5 and No. 6 operate only with the overload relays.



SIMPLE SWITCHING AND NO LOW TENSION CHARACTERIZE KERN CANYON STATION

Referring to the low-tension connections in the drawing, it will be seen that there is no common low-tension bus. The main advantage of a common low-tension bus is that when generator No. 1 happens to be out of service at the same time as transformer bank No. 2, then generator No. 2 can be operated through transformer bank No. 1. In a modern station the probability of any generator or any bank of transformers being out of commission is small, and the probability of coincidence is therefore extremely small. Furthermore, the advantage of being able to connect generator No. 1 with transformer No. 2 becomes of relatively less importance as the system grows. The fact that the two units in this case are of very different size, one being roughly twice as large as the other, was considered also as decreasing the advantage which might otherwise exist, and therefore the scheme as shown was adopted.

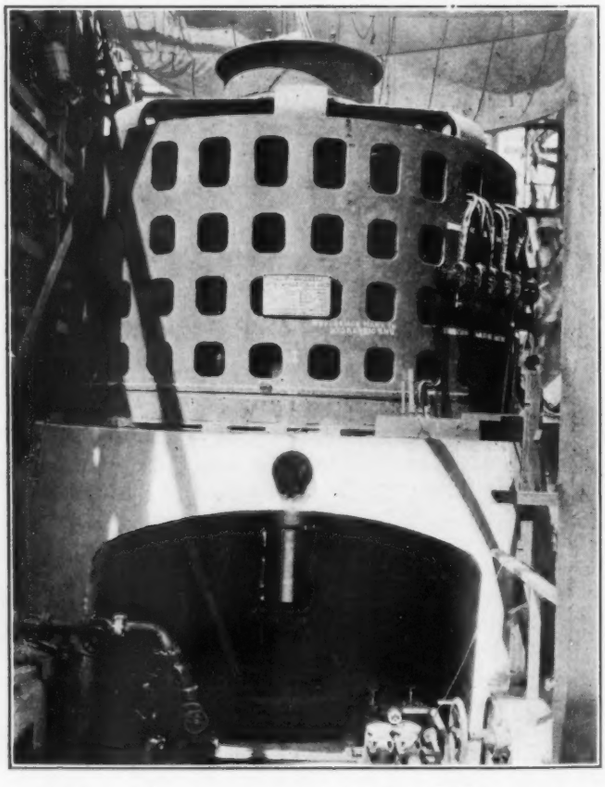


IMPULSE-WHEEL-DRIVEN EXCITER AND HIGH-TENSION RELAY ASSURE UNIFORM VOLTAGE

This scheme considerably simplifies the low-tension lay-out and also the differential protection, which is arranged so that an unbalanced current of twice the full-load current required by the station service and auxiliaries between oil switches No. 1 and No. 3 trips these oil switches and also the generator field switch. The station service oil switch is protected by overload relays of 1-amp. setting so as to trip out in case of trouble back of this switch without interference with the operation of the main unit. Both ends of each phase of the generator are brought out through current transformers and one side is grounded. One set of these current transformers is connected through differentially connected relays with bushing-type current transformers on oil switch No. 3, and the other set of generator current transformers is used for metering.

It will be noted that all the oil switches can be shunted through disconnecting switches, and this permits of inspection and eventual repairs without shutting down the plant. Before disconnecting switch No. 3-b is closed the differentially connected relay must be short-circuited through a triple-pole, single-throw switch provided on the switchboard, since the closing of switch No. 3-b operates to decrease the current in the current transformers of oil switch No. 3 and would therefore actuate the differentially connected relay and trip oil switches No. 1 and No. 3 and the generator field switch.

Oil switch No. 1 was installed because the station as designed would have but one unit, and in case this unit were shut down the only means of getting power into the station would be from the 66,000-volt buses. Disconnecting switches No. 1-b and No. 1-c are so arranged that the station service and auxiliaries, including the



A COMPACT ECONOMICAL ARRANGEMENT HAS BEEN OBTAINED

motor-driven oil pump for the governor system, can be supplied either from the generator or from the transformers. Normally disconnecting switch No. 1-b is closed and No. 1-c is open, so that if oil switch No. 5 should fail to operate, the operator may open oil switch No. 1 and the auxiliaries will be supplied directly from the generator. In case generator No. 1 is shut down, disconnecting switch No. 1-c is closed and No. 1-b is open.

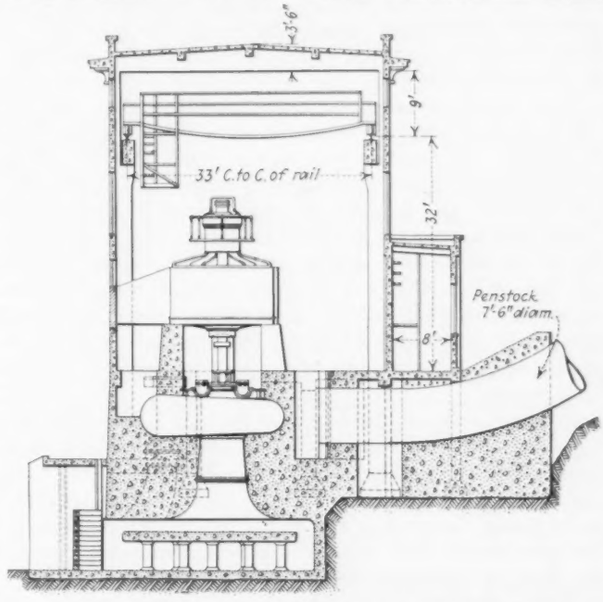
LAY-OUT OF EXCITATION SYSIEM

The method of excitation is somewhat unusual, as is shown in the drawing. The shunt-wound exciter is connected directly to the generator, and the voltage of the alternator is controlled by the rheostat in the exciter field. No rheostat is provided in the alternator field. The exciter field is excited from the direct-current bus, which is connected to the impulse-wheel-driven control unit. This control unit is 25 kw., 125 volts, flat-compound-wound and direct-connected to an impulse wheel provided with an oil-pressure governor. A flywheel of sufficient momentum prevents a decrease in speed of more that 2 per cent when closing an oil switch, assuming that the governor does not have time to act.

This unit is intended to maintain practically constant voltage on the direct-current bus under normal as well as abnormal conditions, and it supplies energy for the operation of the electrically operated oil switches and field switch and also for the indicating lamps. In case of emergency it also supplies about one-half of the power-house lights through an automatic throw-over switch. Eventually there will be two impulse-wheel-driven control units. It was intended to use the impulse-wheel-driven exciter of the old station as a standby, but as the penstock of this station was found to need extensive repairs this exciter could not be used, and therefore a motor-driven exciter was installed in the new station for use in case the control unit should be out of order. The use of the motor-driven control unit is a temporary makeshift of no great merit, since the main object of the control unit is to supply a constant voltage, especially during periods of abnormal conditions, and this the motor-driven unit cannot do. A double-throw field switch is provided so that the exciter in an emergency can excite its own field. This is intended for use only in case the unit is operated as an over-excited synchronous motor and in case no water is available for the control unit. The unit will not operate satisfactorily as a generator in this manner.

No potential regulator is used or intended for this plant, but, as indicated in the drawing, a relay is connected through a potential transformer to the generator circuit, and in case of overvoltage the relay inserts a resistor in series with the exciter field. This is necessary because speed regulation cannot be maintained so closely as with steam turbines, and in case full load is suddenly dropped a considerable increase in the generator speed, about 20 per cent, cannot be prevented, and therefore a very considerable increase in voltage may result, depending largely, of course, upon the power factor of the load.

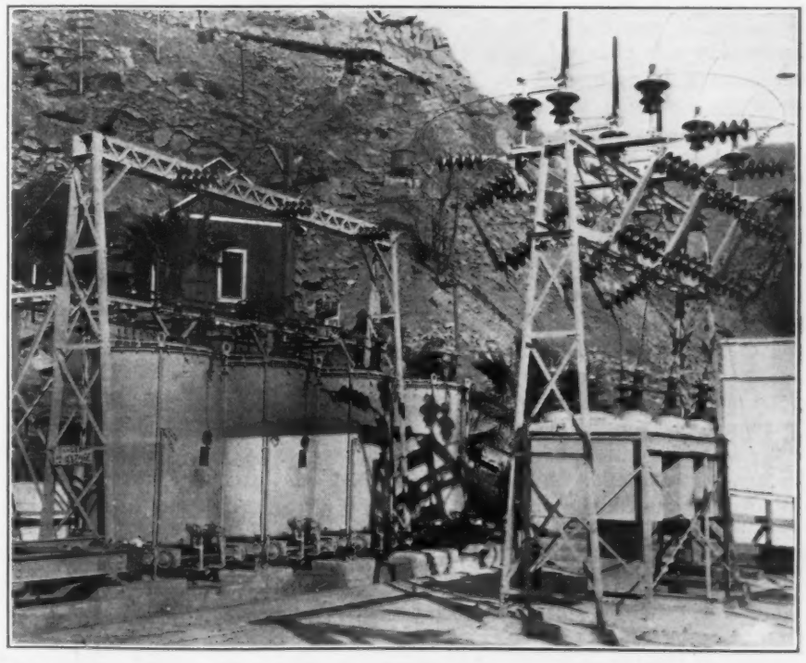
Storage at the intake was not possible on account of the location of the Southern California Edison Company's Kern River No. 1 station. On the intake side of the river and directly over the intake site there is a very dangerous mountain slide; therefore the intake



THE GENERATORS ARE SUPPORTED ON CONCRETE RINGS WHICH RAISE WATERWHEELS TO FLOOR LEVEL

structure was designed with a cushion of loose fill over its top for protection against slides. The structure is a part of the dam and has two 6-ft. (1.8-m.) sluicegates, one in front of the rack bars for the purpose of removing coarse material, and the other behind the rack bars to clean the sand trap.

The tunnel work was the major part of the job and consisted of enlarging the old tunnel from 6½-ft. x 6½-ft.



PORTION OF OUTDOOR HIGH-TENSION SWITCHING AND TRANSFORMING EQUIPMENT

(1.98-m. x 1.98-m.) section to 13½-ft. x 14-ft. (4.11-m. x 4.26-m.) section, the new tunnel to be a pressure tunnel. There are eight adits in the 8,300 ft. (2,530 m.), and as none of them was very long, all but two were enlarged, some of this work being done before the old tunnel was unwatered. The old station was shut down on Jan. 28, 1921, and immediately a track was laid the entire length of the tunnel. As all equipment was to pass through the old tunnel, the equipment was at once distributed so that work could be started from all points at the same time.

Two, and in some cases three, headings, about 250 ft. (75 m.) apart, were worked on each side of an adit, so that while one heading was being drilled the other was being mucked, thus making both operations practically continuous. On account of the excellent ventilation, due to the numerous adits and the pioneer, very little delay was caused by powder smoke. Therefore, it was possible so to plan the drilling and shooting in the numerous headings that the progress depended upon the rate of mucking, which during the last thirty days amounted to 120 linear ft. (36 m.) of tunnel per twenty-four hours.

Five-ton electric locomotives equipped with storage batteries and 2-cu.yd. (1.5-cu.m.) steel side-dump cars constituted the hauling equipment. No trolley was used nor were the batteries removed from the locomotives while being charged at the adits, as enough equipment was provided to have at least one unit always on charge, the time of charging being about three hours. These "Exide" batteries gave no trouble whatever, and in one instance when a locomotive was lost over a dump 200 ft. (60 m.) high it was necessary to go down to the river and open the switch, as the wheels were still spinning on the rocks. When hauled back to the tunnel this unit immediately resumed work without repairs.

It was a very difficult problem to determine the proper section to use in the different parts of the tunnel. From an examination of the old tunnel it would be evident that some parts were certain to need lining, and these would be driven to a lined section; while another part might look as if it should be unlined, but after enlargement it would disclose dangerous ground. Thus the section was changed many times in order to avoid unnecessary lining and at the same time to avoid driving unlined section which would need concrete. This resulted finally in three finished sections—one unlined, one lined to a size much over capacity (being short lengths where the unlined section was not considered safe), and the third being the lined section.

FOREBAY, SURGE CHAMBER AND PENSTOCK

The old forebay was in a large chamber excavated at the lower end of the tunnel, and in part of this the new concrete structure was built. It can best be described as a short piece of tunnel approximately at right angles to the main tunnel, the regular tunnel forms being used, the tunnel entering at one side, two penstocks entering on the opposite side, and there being a 36-in. (0.9-m.) sluicegate in one end. A sand trap and rack bars were provided to guard the turbine from débris from the unlined section. In the remaining part of the old chamber the two butterfly valves at the top of the penstocks were placed.

Only one penstock was built for the present development, it being of riveted steel plate, 8 ft. (2.4 m.) in diameter at the top and 7 ft. (2.13 m.) at the wheel and 568 ft. (173 m.) long. It is supported on concrete piers and in addition to being backfilled has concrete anchors at the bends.

Only one new unit has been installed, but one end of the building is of temporary construction with foundations installed for one future unit. The present unit with its auxiliaries was manufactured by the Allis-Chalmers Company and consists of a 12,000-hp. Francis-type vertical turbine, operating under a head of 230 ft. (70 m.), with a plate-steel casing, butterfly valve and pressure-regulating valve, directly connected to a 10,600-kva., 11,000-volt, 60-cycle, 257-r.p.m. generator with a Kingsbury bearing, on top of which is mounted a direct-connected 864-kw., 125-volt flat-compounded exciter. A White regainer was installed in the draft tube.

WATER WHEEL ON MAIN FLOOR

An unusual feature of this plant is that the waterwheel is reached from the main floor, there being no pit, and in order to accomplish this the generator is supported on a concrete ring, the top of which is 7 ft. (2.1 m.) above the floor. One advantage of this is that the governor, control unit, switchboard and valve-operating mechanism are all on the same floor, so that one operator and an oiler compose the entire operating crew.

The switchboard consists of four panels—control unit, exciter, generator and line panel. On the control panel is mounted an automatic throw-over switch for the station service control in addition to the regular instruments. Provision is made on the exciter panel for the future unit. On the generator panel are mounted the indicating instruments, control switches, differentially connected relays, station service relays and the exciter field rheostat.

The high-tension bus is of the outdoor type, the supporting structure being steel towers. The voltage is stepped up from 11,000 to 66,000 by a bank of 3,600-kva., single-phase transformers, which are connected delta on the low side and star-connected on the high side, with the neutral grounded. The 11,000-volt current is brought from the bus room by 800,000-circ. mil lead cables.

The cost of the development as reported to the California Railroad Commission is as follows:

Water conduits	$997,142
Penstocks	127,000
Dams and reservoirs	130,000
Building	203,000
Turbine, generator and exciters	368,000
Switchboards, switches, transformers and miscellaneous	124,753
Total	$1,949,895

The plant has been operating some time and the operating department reports it has experienced no trouble of any kind under normal or abnormal conditions.

The construction of this project was carried out under the direction of R. C. Starr, construction engineer for the San Joaquin Light & Power Corporation, whose organization consisted of the authors, who were respectively superintendent and designing engineer; J. D. McDougald, general foreman; Victor Rynning, general storekeeper; E. L. Fox, tunnel foreman; George Fisher, chief electrician; D. J. Pease, master mechanic, and W. B. McMillan, resident engineer.

Electric Fires and Electric Fire Losses During 1920*

Reduction in Proportion of Fires of Electrical Origin Apparent —Liability to Fires Is Governed by Local Conditions Which Are Controllable—Deductions from the Investigation

By REGINALD TRAUTSCHOLD, M.E.
Society for Electrical Development, Inc.

THE report of the Society for Electrical Development on electric fires during 1919, coming out last year as it did soon after the appearance of the five-year report of the National Board of Fire Underwriters, demonstrated very conclusively the absence of any relation between the number of fires attributable to the use of electricity in residential and commercial buildings and the monetary loss resulting from such fires. This was foreseen and emphasized in the society's report of last year, but the possible difference in the interpretation of the statistics presented by the two organizations led to many conflicting and misleading statements being made—particularly in newspaper "feature" articles. For this reason the study of fire reports for 1920 has been extended to cover the question of losses occasioned by fires of electrical origin as well as their number.

As in the case of the investigation last year, the data were gathered first-hand from the official reports submitted by the fire departments of various communities and have been carefully analyzed, compared and classified. When the reports as received appeared questionable, the records were checked up by representatives of the local central-station company and by city officials, and in a number of instances valuable information has been furnished by the fire underwriters, making the tabulated records as authentic and unbiased as possible.

Complete reports on the prevalence of fires of electrical origin in residences and commercial buildings—the only class of fires which can logically be attributed to the introduction of electric service—were received from 314 communities, having an aggregate population of close to 25,000,000 people. This is probably about 40 per cent of the population of the country reached by central-station lines in 1920 and a considerably larger proportion of the people residing in communities of 5,000 or more. From 263 of these communities complete records of fire losses were obtained.

*Digest of the 1922 report by the Society for Electrical Development, Inc.

NUMBER OF ELECTRIC FIRES

In the 314 communities a total of 121,999 fires occurred during the year, of which number 2,971—in residences and commerical buildings—were probably attributable to the use of electric service, giving an electric fire ratio of 2.44. This record is about 4.3 per cent better than that of the previous year, and a glance at Table I will suffice to show that this improvement has been brought about largely by betterment of conditions in the two largest cities in the country.

Table I, which presents fire statistics classified by population groups, indicates that there is little, if any, relation between the size of the communities and the prevalence of fires of electrical origin. However, the largest cities of the country, with their more stringent building regulations, better inspection systems and stricter enforcement of precautionary measures, have exceptionally low electric fire ratios, as do also some of the smaller communities, particularly those of a high residential class. It is among the large towns and more rapidly growing cities—many of them of large size—that the largest electric fire ratios occur. This is due to many and variable conditions—inflammable building construction, hazardous pursuits, climatic conditions and laxness in inspection and in protective regulation being prominent. It is for these reasons that any fire ratio based on general averages is misleading and fails to give a reliable idea of true conditions.

In the study made by the Society for Electrical Development the actual electric fire ratios for the individual communities are arranged graphically in the order of

TABLE I—NUMBER OF FIRES OF ALL ORIGINS DURING 1920

Population Group	Number of Cities	Population		All Fires			Electric Fires			Other Fires in Bldgs.		Per Cent Ratios	
		Aggregate	Average per City	Aggregate	Average per City	Average per 1,000 People	Aggregate	In Buildings	Average per City in Buildings	Aggregate	Average per City in Buildings	Electric Fires in Buildings to All Fires	Electric Fires in Buildings to Other Fires in Buildings
5,000— 10,000	89	596,986	6,708	4,262	47.9	7.2	137	103	1.16	3,657	41.1	2.42	2.82
10,000— 15,000	55	649,303	11,803	4,121	74.9	6.4	144	102	1.85	3,698	67.2	2.47	2.76
15,000— 25,000	57	1,043,955	18,315	6,893	120.9	6.6	237	177	3.11	5,850	102.6	2.57	3.03
25,000— 40,000	28	884,634	31,594	5,056	180.4	5.7	217	154	5.50	4,083	145.8	3.04	3.88
40,000— 55,000	23	1,062,653	46,202	7,013	304.9	6.6	270	106	6.79	6,117	261.6	2.22	2.60
55,000— 75,000	18	1,193,270	66,293	8,346	463.7	7.0	290	179	9.90	6,942	385.7	2.14	2.58
75,000— 100,000	10	887,149	88,715	4,558	455.8	5.1	187	139	13.90	3,920	392.0	3.05	3.54
100,000— 150,000	13	1,562,430	120,187	13,106	1,008.2	8.4	845	278	21.39	11,308	869.9	2.12	2.46
150,000— 250,000	6	1,202,667	200,444	6,117	1,019.5	5.1	350	171	28.50	3,646	607.7	2.79	4.68
250,000— 500,000	9	3,302,944	366,994	15,387	1,709.7	4.7	902	549	61.00	12,674	1,408.2	3.57	4.33
500,000—1,000,000	4	3,431,310	857,828	18,502	4,625.5	5.4	1,210	688	172.00	14,324	3,581.0	3.72	4.80
Over 1,000,000	2	8,120,048	4,060,924	28,638	14,319.0	3.5	904	275	137.50	26,557	13,278.5	0.96	1.04
Aggregates.....	314	23,937,349	.....	121,999	.....	...	5,693	2,971	.....	102,676	.....	2.44	2.90–2.82

their magnitude, permitting a much more accurate appreciation of the liability to such fires. In fact, smooth enveloping curves depict with considerable accuracy the liability to fires of electrical origin in each population group. These curves are quite similar, their reliability in depicting liabilities for electrical fires being governed by the number of individual fire ratios recorded in the respective groups. The general similarity of these curves indicates, furthermore, that by giving each curve a "weighted" value, conforming to the number of communities it represents, composite curves can be drawn which will show reliable electric fire "liabilities."

Such composite curves are reproduced in Fig. 1, and it will be noted that, while the grand average fire ratio was 2.44, the fire ratio in 63 per cent of the communities was less and in fully half the places was not more than 1.4. In 40 per cent of the communities it was less than 1, and in 30 per cent not over 0.5. If only fires occurring in buildings, residential and commercial, are considered, the curves show that while in the aggregate there were thirty-four and one-half fires due to non-electrical causes to every fire of electrical origin, this ratio was not equaled in 63 per cent of the communities, and in fully half of the towns there were at least fifty-seven and one-half non-electrical fires for every fire attributable to the use of electric service. In 40 per cent of the towns and cities reporting there were at least ninety-two non-electrical fires in buildings to one electrical, and in 30 per cent of all of the communities the minimum number of fires originating from other causes was close to 150 for each one traceable to the use of electric service.

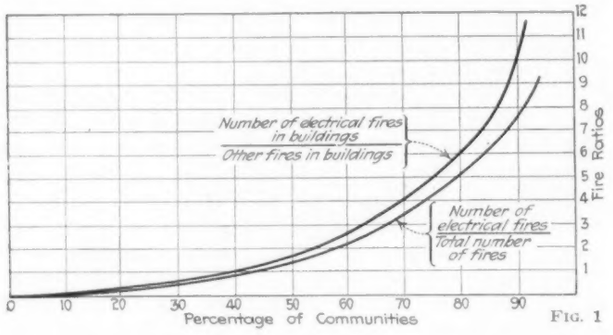


FIG. 1

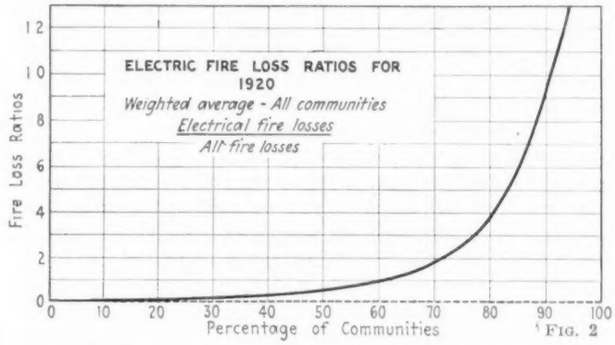


FIG. 2

FIRES RESULTING FROM THE USE OF ELECTRICITY ARE SUSCEPTIBLE TO CONSIDERABLE CONTROL AND FORM ONLY A SMALL PERCENTAGE OF ALL FIRES

These statistics demonstrate clearly that the fire risk from the use of electricity in residences and commercial buildings is susceptible of considerable control, for among the localities in which fires of electrical origin are relatively rare are some of the most thickly populated as well as many of the smaller communities.

Such an analysis may appear somewhat contradictory, but if a study is made of the causes of electric fires, the statistics are really quite illuminating in ascribing the reason for the wide variations in electric fire ratios. Generally speaking, fires of electrical origin may be classified under three main groups—(1) those which are due to static electricity, lightning, street-railway current, automobile electric systems, etc.; (2) those due to defective wiring, defective apparatus, etc., and (3) those due to carelessness in the use of electric flatirons, abuse of portable cords, overfusing and overloading of circuits, etc.

The responsibility for the fires falling in group 1 cannot in justice be laid to the use of electric service, so they have been excluded so far as possible from the fire department statistics under consideration. The fires placed in group 2, on the other hand, are attributable to the use of electric service, and, naturally, it is in their suppression that the electric industry is particularly interested. The interest of the industry does not, however, necessarily mean responsibility for the fires. On the contrary, the responsibility should be largely one of city and insurance inspectors, and this is conclusively demonstrated by the fact that in communities, large and small, where inspection, reinspection and enforcement of proper precautionary measures are most rigid the proportion of fires of electrical origin is, as a rule, substantially below the grand average.

LOW ELECTRIC FIRE RATIOS

Probably the most striking example of low electric fire ratio is that for Chicago, where more central-station electrical energy is generated and used than the aggregate consumption for the states of Maine, New Hampshire, Rhode Island, Connecticut, North Dakota, South Dakota and Wyoming combined. Excellent records have been established in New York, Richmond, Va., Cambridge, Springfield and Lowell, Mass., Evansville, Ind., and Hartford, Conn.; and in numerous smaller communities there were no fires of electrical origin during 1920, although the use of electric service was very general. This shows that it is not the use of electricity which introduces a fire hazard, but its abuse.

The third group of electric fires, those attributable to carelessness with flatirons, abuse of portable cords, overfusing and overloading circuits, etc., would also seem to call for municipal attention or community regulation. The responsibility for such fires lies with the user of electric service—either because of ignorance or through disregard of necessary precautions. The proper use of electricity does not constitute a fire hazard, but is, on the contrary, one of the most effective agencies in reducing the liability to fires. This is generally admitted, but the serious mistake is also quite general of emphasizing the enormous losses occasioned by fires attributable to the abuse, careless use and faulty installation of electric systems—things which for the most part are preventable. The result of such ill-advised propaganda, if it had any lasting effect, would obviously be to discourage the substitution of electrical energy for other forms of light, heat and power which are themselves more or less dangerous.

The fact that the use of electric service continues to increase steadily is conclusive evidence that the public is little influenced by these alarming reports. But this

is not entirely satisfactory because it signifies that the public not only disregards in large measure ill-advised warnings of the dangers of electricity, but is inclined to disregard as well reasonable precautions in its use. The impunity with which electric service can frequently be abused constitutes its chief hazard.

The unreliability of newspaper accounts was forcibly verified in a careful investigation of the fires reported as being of electrical origin in the daily press. In five out of six cases the investigations showed that the use of electricity played no part whatever in causing the fires.

ELECTRIC FIRE LOSSES

A study of electric fire losses is of interest, though of secondary importance in that the chief consideration should be the liability to fires from electric service, because the losses, no matter how regrettable, are incidental to whatever hazard may be introduced by the service. This is particularly true in view of the wide publicity given to the heavy fire losses which have been attributed to the use of electricity.

Following the same general method of analytical investigation adopted in the case of the study of the number of fires, the electric fire loss statistics culled from the 263 community reports received have been analyzed, Table II listing the collective data arranged in population groups, but there is no apparent relationship either to group population or to the prevalence of electric fires as indicated by the electric fire ratios given in Table I. The general average fire-loss ratio, based upon the aggregate of all fire losses, is 3.28, which is substantially less than that of the majority of individual group ratios, although considerably greater than the general average electric fire ratio of 2.44 given in Table I. These ratios of prevalence of and losses due to fires are not really comparable, being based upon values which cannot bear any definite relation to one another.

The composite weighted curve shown in Fig. 2 indicates that the liability to electric fire loss is well below the average of 3.27 per cent in nearly 80 per cent of all communities, and that in 60 per cent of the communities it is less than 1 cent in each dollar of total fire loss. In half the communities enjoying electric service not over ½ cent per dollar of fire loss is attributable to the use of electric service, and in 40 per cent of the communities 3 cents is a maximum electric fire loss for each $10 destroyed by fire. In twenty communities out of every 100 the electric fire losses constitutes at most 10 cents in every $1,000 of fire loss.

These statistics, based upon official statements from the fire departments of the various communities, differ greatly from those in reports published by organizations interested primarily in the question of losses on insured property, in which general averages only are presented; but this should not be unexpected. In the case of buildings, both residential and commercial, the more valuable the property, as a rule, the more apt it is to be covered by insurance, and almost invariably such buildings have electric service. This means that the losses on insured property are quite certain to be relatively much greater than those on uninsured property.

INCENDIARISM

A contributory cause to the heavy losses in insured buildings or contents of buildings which should be taken into account in any careful study of the question is incendiarism. It is estimated more or less officially that 40 per cent of all fires in New York City during recent years have been of incendiary origin. Of course, such fires always occur on insured property, and it is always difficult to trace their origin. If an incendiary fire is successful, its origin is effectively concealed and evidence of cause destroyed. Much the same absence of origin is characteristic of a disastrous fire of electrical origin.

TABLE II—FIRE LOSS STATISTICS FOR 1920

Population Group	Number of Cities	Total Fire Losses		Electric Fire Losses		Per Cent Ratio of Electric Fire Losses to Total Fire Losses
		Aggregate	Average per City	Aggregate	Average per City	
5,000— 10,000	77	$2,317,431	$30,097	$154,018	$2,010	6.65
10,000— 15,000	50	1,735,478	34,710	42,247	845	2.44
15,000— 25,000	51	4,181,984	82,000	42,195	827	1.00
25,000— 40,000	26	1,935,405	74,439	75,076	2,888	3.88
40,000— 55,000	19	5,007,972	263,577	352,183	18,536	7.04
55,000— 75,000	14	3,382,718	241,624	436,060	31,147	12.90
75,000— 100,000	4	448,104	112,026	58,219	14,555	13.00
100,000— 150,000	9	4,699,401	522,156	51,910	5,768	1.10
150,000— 250,000	5	3,237,547	647,509	169,917	33,983	5.25
250,000— 500,000	4	3,921,212	980,303	198,886	49,722	5.06
500,000—1,000,000	2	7,475,985	3,737,993	304,945	152,473	4.08
Over 1,000,000	2	29,806,908	14,903,454	346,459	173,230	3.28
Aggregates.....	263	$68,150,145	.....	$2,232,115	.....	3.28

SUMMARY

In the conduct of this study of electric fires, particularly as it pertains to the prevalence of such fires, numerous inaccuracies were discovered in the reports of electric fires, many more fires were found attributed to the use of electricity than were actually due to it, and many interesting comments by city and fire department officials were gathered regarding the safety of electricity when properly used. To cite these things would, however, add little of constructive value to a presentation of this character. To draw attention again to certain points of evidence and to logical deductions brought out by the study should, on the other hand, be of constructive value. These salient points are:

1. Coincident with the rapid introduction and extension of electric service, some reduction in the proportion of fires of electrical origin is apparent, indicating that the introduction of electric service is in reality a safety movement and in itself does not introduce a fire hazard.

2. The liability of fires attributable to the use of electric service is not susceptible to measurement by general averages, but is governed by local conditions which are controllable to a considerable extent.

3. The liability to fires of electrical origin in individual communities places the communities in well-defined groups in which the electric fire risk can be measured with considerable accuracy—the ranking being established by the records of previous years. Consequently, a system of classification of communities according to their liability to electric fires would unquestionably have a tendency to bring about better inspection and regulation methods in the individual communities in an attempt to improve their ranking.

4. A suitable classification of electric fires in civic and insurance reports will serve to indicate the responsibility for an excessive number of fires in any particular class, permiting the introduction of suitable remedial measures and the enforcement of suitable regulations.

Household Appliance Publicity*

A Discussion of the Question "Are We Advertising Electrical Home Equipment in the Proper Way?"

BY W. P. STRANDBORG
Portland, Oregon

ONE of the main difficulties in the way of getting the best and most consistent results out of our advertising expenditures for electrical home equipment is that few of the central-station men—commercial managers, sales managers or advertising managers—have even an approximate idea of how much money they will be permitted to spend throughout the calendar or fiscal year. In other words, lack of definite and fixed advertising budgets (on a percentage basis), with some flexibility to care for emergency needs, impairs to a substantial degree the value of the very best efforts of the men in charge of this phase of the industry.

Lack of definite budgets prevents the commercial department from laying out a definite plan for the year ahead and interferes with or handicaps the achievement of a definite objective for the year's work. The chief reason that such a situation exists is that our central-station executives are not always so completely sold on the value of vigorous, consistent and aggressive local advertising campaigns as we ourselves are. Many of these executives, however, are coming around to our way more and more, so that the future right now looks brighter than ever for building up good and growing residential loads.

Smaller companies that do not have or cannot afford to have their own advertising managers should, by all means, place their advertising accounts in the hands of a reliable advertising agency which has the facilities and experience and equipment for handling public utility business. It is rarely safe for the small station to trust its advertising affairs to some (or any) office man who knows nothing about advertising if it expects to get a proper return for the money expended. Indeed, many of the largest and most important plants in the country turn all their advertising business over to commercial agencies, which handle the work under the direct supervision of the advertising manager of the company.

LOCAL CONDITIONS MODIFY METHODS

Most of the central-station companies have been reasonably well educated as to the best media for advertising, through the co-operative advertising and sales helps furnished free of charge by the manufacturers—a gratuitous service worth thousands of dollars a year to any company that avails itself of it intelligently—and are therefore standing on pretty sure ground in this respect. But there is one danger in relying too strongly on such "boosts." Local conditions enter into the field quite frequently, and it is at such times that the local company must rely on its own ingenuity and resourcefulness to meet the condition.

Such occasions are, for example, extension of service into new territory, reduction or change in rates, drives for the reduction of excessive stocks of certain kinds, special demonstration weeks or periods, and also periods of extraordinary building operations. House-wiring campaigns might also be included in this list. Co-operative advertising and sales helps are valuable to a greater or less extent under such conditions, but to meet the problems most effectively a careful survey by the home company is vital. The advertising department has its own problem to solve at such times, mainly in determining how its appropriation may be most wisely distributed. In other words, the choosing of media in cases like this acquires greater importance than in dealing with normal and general conditions.

Occasions may arise where exclusive direct mail campaigns are greatly to be preferred to an exclusive newspaper display advertising campaign, or to a co-ordinated drive where several standard media may be used—or just the reverse may be true. Sometimes "single-shot" drives have been tremendously successful and sometimes they have fallen flat. Only study and experience can determine such matters. But what intelligent advertising does at all times is to greatly reduce, and oftentimes entirely eliminate, the guesswork in salesmanship and business building.

MAIL LITERATURE GETS RESULTS

The writer is strongly of the opinion that the central stations, as a rule, do not avail themselves sufficiently of the abundant opportunities for creating new and expanding old business through the use of direct mail literature which is so well got up and so economically supplied to the central stations by the National Electric Light Association and by the electrical manufacturing industry. The present indications, are, however, that hundreds of the central stations are coming to see the importance of this co-operative material. All of it may be secured with the home company imprint and be used as original matter in the form of "bill stuffers" or sent out with original letters to the customer mailing list and even to new "prospects."

One weakness in our armor is almost a universal one and that is our failure to "tie into" and co-ordinate our own efforts with the various great and carefully planned national advertising campaigns which have recently sprung into more and more prominence in our industry. These are of extraordinary educational value, prepared by experts and designed to meet both national and local conditions. They are not always designed to meet local conditions 100 per cent, for that would be impossible under any circumstances, and that is why the local company should be ready to take advantage of the cumulative benefits of this high power advertising by using well-directed local copy to support it.

There never was a time when this phase of the local problem presented such excellent opportunities for efficient publicity as the present. The whole electrical merchandising industry seems to be working shoulder to shoulder this year with a view of making it the most successful business-building year in the annals of the entire industry. How widespread and comprehensive is this unprecedented co-operative movement will be apparent to any one who reads the daily newspapers. The wide-awake central-station man is, of course, familiar with it already. But most of us are overlooking or neglecting our own responsibility and opportunity to "cash in big" during these great national drives. The very momentum of these dominant advertising drives should pick us up and carry us along with it to the extent of spending at least 25 per cent as much money for advertising in our home papers as these national institutions are doing for us.

*Paper presented before the Northwest Electric Light and Power Association, Boise, Idaho.

Electrical Layout in Bay State Cotton Mill

Safety-Front Switchboards—1,320 Watts per Lighting Circuit —Mounting of Motors and Control—Unusually Flexible and Accessible Distribution Circuits—Lighting and Power Data

By WILLIAM S. MADDOCKS
Electrical Engineer Lockwood, Greene & Company, Boston

UNTIL the construction of the Lowell (Mass.) mills of the Bay State Cotton Corporation* picker houses had always been on the ground floor, material in process advancing upward by stages until as finished yarn it reached the top. Material was carried from floor to floor by elevators. In these new mills, however, the plant has been literally turned upside down, the picker house being on the roof. Material in process descends by gravity conveyors to the lower floors, where the spinning is done, the finished yarn going to an underground tunnel, whence it is carried to the weave mill by electric tractors. The method of supplying electric service and some of the reasons for arranging the power and lighting equipment in the manner adopted are presented below.

SUBSTATION FACES MAIN OFFICE ON CITY STREET

Supplying power to the mill would have been an almost insurmountable task in the old days of rope drive, because the best available site for a power house had the disadvantage of being on the opposite site of a trunk-line railroad from the weaving mill. With electrical distribution, however, power supply was hardly a problem at all.

Energy is delivered to a substation directly across the street from the mill office by the Lowell Electric Light Corporation over three 13,200-volt, 60-cycle underground lines, this number being used to assure continuity of service. The energy is obtained at an average cost to the mill of 2.3 cents per kilowatt-hour. Aside from the reasons implied above, central-station service was selected because of the excessive investment charge which a mill plant would have entailed.

The substation, measuring about 43 ft. x 49 ft. in plan, is designed to house ultimately twelve 500-kva., 13,200/600-volt single-phase transformers and the necessary switchboard equipment. Six transformers are at present installed, the units being rated at 333 kva. each. The Lowell Electric Light Corporation standardizes on this size for the larger industrial establishments to facilitate the immediate replacement of burned-out units. Each transformer is equipped with primary oil circuit breakers having inverse-time-element overload features. No secondary oil switches have been provided, but single-pole disconnecting switches are inserted in both high-tension and low-tension sides to facilitate cutting out any transformer on short notice. While this arrangement makes it necessary to cut service off the mill while removing a transformer, the infrequency of such an occasion and the resulting simplification of the electrical layout justified it.

A "dead-front" type of switchboard is provided in the substation, the bus structure being mounted directly behind the board. Both were furnished by the Westinghouse Electric & Manufacturing Company. No lighting switches are mounted on the front of the board. All lighting is supplied by 600-volt feeders controlled by Krantz safety-type switches mounted behind the switchboard and operated by levers from the front. Local transformers reduce the potential to 120 volts for mains and branch circuits. Three 25-kva. single-phase induction feeder regulators equipped with line-drop compensators and relays insure close voltage regulation.

All the power feeders, which are 600-volt three-phase circuits, are controlled by panel-mounted oil circuit breakers equipped with inverse-time-element overload features.

TABLE I—LIGHTING EQUIPMENT AND SPACING USED IN BAY STATE COTTON MILL WITH INTENSITIES AND POWER REQUIREMENTS PER SQUARE FOOT

Process	Lamp		Reflector Type	Mounting Height (Ft.)	Spacing (Ft.)	Foot-Candle Intensity (Calculated)	Watts per Square Foot
	Watts	Type*					
Pickers	100	C	RLM	10½	14 x14	3.10	0.51
Cards	100	C	RLM	10½	10½x10½	4.80	0.91
Lappers	100	C	RLM	10½	10½x10½	4.80	0.91
Combing	100	C	RLM	10½	9½x 9½	5.90	1.11
Drawing	100	C	RLM	10½	10 x10	5.30	1.00
Slubbers	100	C	RLM	10	11 x11	4.40	0.83
Intermediates	100	C	RLM	10½	9½x 9½	5.90	1.11
Fine frames	100	C	RLM	10½	9½x 9½	5.90	1.11
Spinning	100	C	RLM	10½	10½x10½	4.80	0.91
Spoolers	100	C	RLM	10½	11 x11	4.40	0.83
Warpers	100	C	RLM	10½	11½x 8½	5.70	1.02
Pilot system	75	C	RLM	15½	56		
Stairways	75	C	Deep-bowl	7½	.....	1.70	0.60
Toilets	75	C	Deep-bowl	10	.....	1.20	0.45
Tunnel	60	B	None	8	10	1.8	0.60
Basement	100	C	RLM	10½	14 x14	3.00	0.51
Yard lighting	500	C	RLM	55	.....	0.55	0.51
Storehouse	75	C	None	7½	17 x18	1.35	0.24
Storehouse stairways	60	B	None	7½	.....	1.00	0.46

* Mazda.

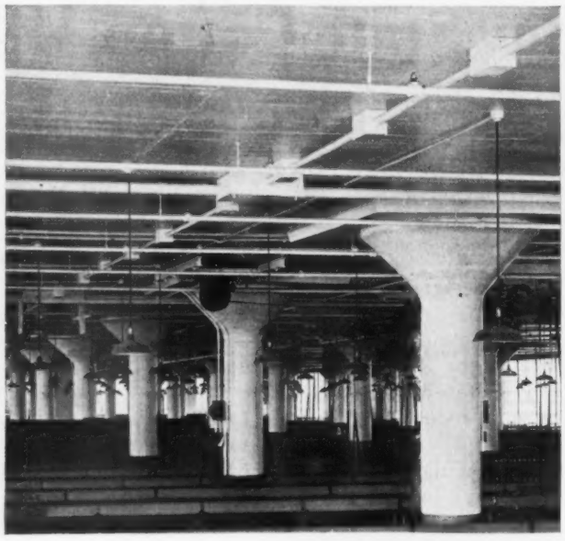
From the transformer house to the weave mill there is a reinforced-concrete duct line containing forty 3½-in. Orangeburgh fiber ducts, and in the basement of the weave mill are splicing chambers. Feeders are carried to the yarn mill in a fiber-duct line in the west wall of the trucking tunnel. Wherever lead cables emerge from ducts they are wrapped with several layers of asbestos tape and coated with silicate of soda to prevent a short circuit in any one cable from damaging the rest.

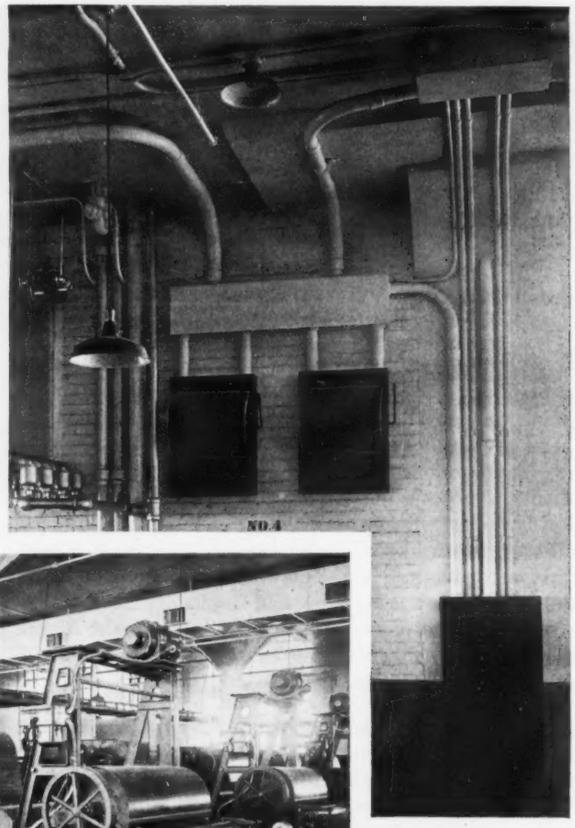
OPEN-CONDUIT WIRING SIMPLIFIED JOB

Wiring in the mill storehouse and tunnel is run in galvanized rigid-conduit run exposed on the surface, this being done to keep the building construction and electrical contacts separate, with the further advantage that when changes are decided upon in the machinery location after the pouring of the floor slabs the conduit system is not affected as it would be if concealed.

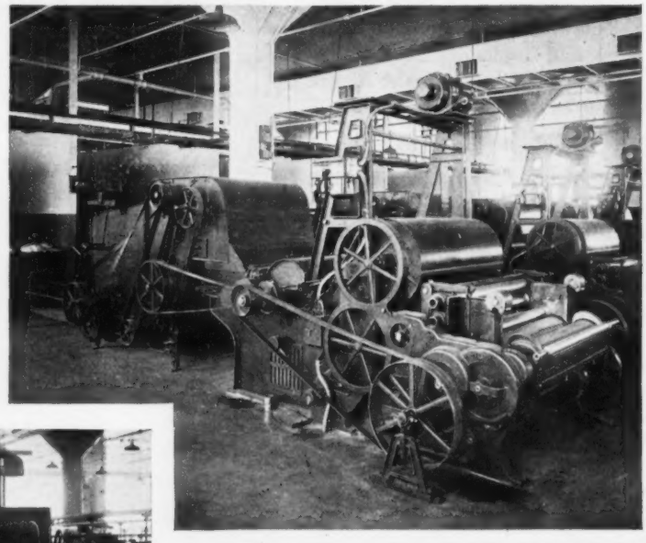
Excellent natural lighting was obtained by the use

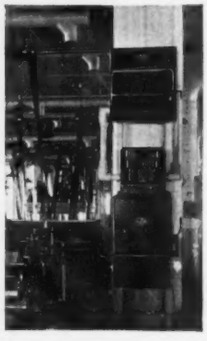
*International Cotton Mills.

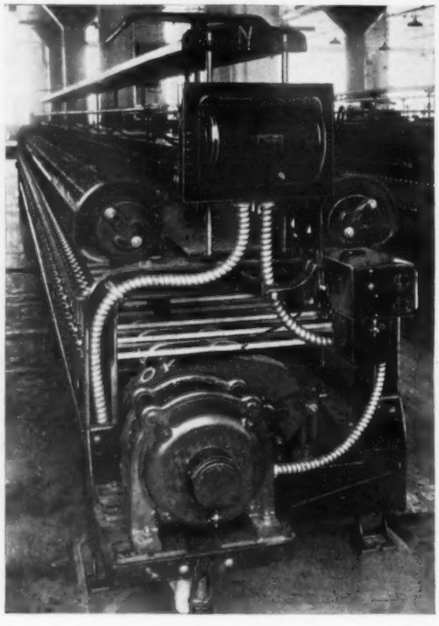


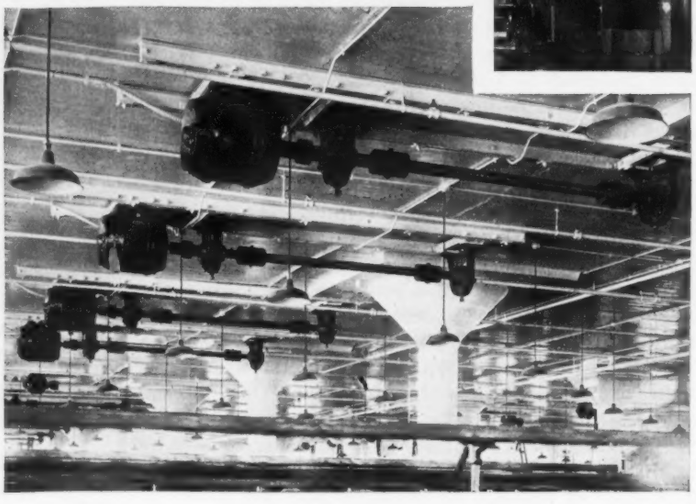


Modern Practice in Cotton Mill Electrification









The use of exposed conduit, modern safety equipment and compact but convenient motor installations in a cotton mill marks another step forward in the applications of electricity to industrial service. Convenience and the unit isolation of troubles were dominant features of the Bay State Mill installation.

of steel sash and flat-slab construction with mill-white paint. The artificial lighting was determined on the basis of the data shown in Table I, and the calculated intensity checked closely with meter readings taken since the installation was made. In general, Benjamin dome RLM enameled-steel reflectors are used with 100-watt type C lamps for most of the interior illumination. All lighting cabinets are of the Crouse-Hinds safety type with push-button switches, the cabinets being of No 10 gage steel and having three-wire, three-phase mains with two-wire branch circuits.

BRANCH LIGHTING CIRCUITS TAKE 1,320 WATTS

Permission was obtained from the insurance interests and city of Lowell inspection department to use 1,320 watts per branch lighting circuit in all departments except the picking and carding sections, upon agreement to install keyless sockets out of reach of operatives and to feed directly through No. 14 wire. A pilot-lighting system of low intensity was provided on all floors and controlled by a switch in the transformer house. This service is on a separate feeder and is associated with a duplicate service from the Lowell Electric Light Corporation and from a small generator in the weave mill to insure positively continuous illumination in case of emergencies. Reflectors for general illumination are hung from reinforced slicked cord to insure good alignment and easy adjustment. A special study was made of each operation in planning the lighting layout, and the units were placed to avoid definite shadows in the working spaces. In the cotton storehouse bare lamps in box receptacles were used with wire guards but no reflectors. A locking type of guard was used to prevent theft of lamps.

MOTOR APPLICATIONS COMPACT

In the selection of motors individual drive was used for the pickers and spinning frames with two-frame and four-frame drive for roving frames and group drive for the other machines. All motors and starting equipment are of General Electric make. In mounting motors for the picker drives A-frames were used to permit a sufficient length of belting. The starting switch is mounted on the opposite side of the machine from the motor, easy of access, and is provided with both overload and undervoltage protection. Below the starting switch is mounted a "No-Ark" service cut-out which can be used as a "disconnect" in case of trouble with the starting switch. As the fuse is placed near the rigid conduit riser which feeds the motor from the floor below, the designing engineers were permitted to use flexible metallic conduit for the connections between the starting switch and motor.

The spinning-frame motor in each case is mounted on a bracket provided by the manufacturer of the frame. On account of the short distance between the frame shaft and motor shaft a Morse chain drive is used, it being inclosed in a sheet-iron case which protects the frame from oil throwing and provides a lubrication chamber for the chain.

POWER FUSES MORE ACCESSIBLE THAN USUAL

In the older textile mills it has been the practice to install a fuse wherever the size of wire was changed. This usually brought the cut-outs on the ceiling over the frames and consequently caused much inconvenience on account of their inaccessibility. In the Bay State installation a concession was obtained from the insurance interests and from the local authorities to place the protective device above the floor where it was accessible. To obtain this concession it was necessary that the tap should be one-third the current capacity of the feeder from which it branched and the protective device not over 12 ft. from the point of tap. The conduit feeding the motors was run on the ceiling of the floor below small junction boxes, being placed directly under the risers, which pass through the floor and terminate at the motor brackets. Just above the floor a type LL condulet is installed with the armored flexible conductor connected at one side. While the code does not require a disconnecting switch ahead of automatic oil circuit breakers, the engineers on this job installed an unfused "Square D" safety-type switch because of the large number of motors tapped off the same feeder. In case of trouble in any oil switch, therefore, on any frame, the trouble can be isolated by opening the safety

TABLE II—RATING OF MOTORS AND METHOD OF ATTACHING TO MACHINES IN BAY STATE COTTON MILL

Item No.	No. of Machines	Description of Machine	No. of Motors	Hp., Each	Temperature Rating, Deg.	No-Load Speed, R. P. M.	Mounting	Type	Remarks
		PICKING MACHINING							
1	2	36-in. No. 4 bale breakers	2	7½	50	720	Ceiling	Picker*	Individual drive
2	6	40-in. single-beater breaker lappers with feeders	6	7½	40	1,200	A-frame	Picker	Individual drive
3	8	40-in. single-beater finisher lappers	8	5	40	1,200	A-frame	Picker	Individual drive
		WASTE MACHINERY							
4	1	Two-section W3 roving-waste machine	1	10	40	1,800	A-frame	Picker	Double-shaft extension Outboard bearing
		CARDING MACHINERY							
5	70	40-in. revolving flat cards	1	100	50	900	Ceiling	Standard	Group drive
6	41	40-in. revolving flat cards	1	60	50	900	Ceiling	Standard	Group drive
7	63	40-in. revolving flat cards	1	75	50	900	Ceiling	Standard	Group drive
8	36	9¾-in. sliver lap machines, 20 ends 6 11¾-in. ribbon lap machines, 4 heads 6 11¾-in. combing machines, 8 heads 24 9¾-in. sliver lap machines, 20 ends	1	50	50	900	Ceiling	Standard	Group drive
9	4	11¾-in. ribbon lap machines, 4 heads 4 11¾-in. combing machines, 8 heads	1	30	50	900	Ceiling	Standard	Group drive
10	72	Deliveries first drawing (metallic) 72 Deliveries second drawing (rolls)	6	10	50	900	Ceiling	Standard	Group drive
11	6	Slubbers, 12x6 bobbin, 64 spindles	3	7½	50	720	Ceiling	Two-frame flexible	Coupling drive
12	8	Intermediate, 10x5 bobbin, 92 spindles	4	7½	50	720	Ceiling	Two-frame flexible	Coupling drive
13	16	Intermediate 10x5 bobbin, 92 spindles	4	10	40	720	Ceiling	Four-frame flexible	Coupling drive
14	20	Fine frames, 8x3½ bobbin, 160 spindles	10	10	50	720	Ceiling	Two-frame flexible	Coupling drive
15	32	Fine frames, 8x3½ bobbin, 160 spindles	8	15	40	720	Ceiling	Four-frame flexible	Coupling drive
		SPINNING MACHINERY							
16	154	Ring frames, 3½-in. gage, 228 spindles	154	7½	40	1,800	Bracket		Individual chain drive
17	16	Spoolers, 5-in. gage, 6 travelers, 140 spindles	2	10	50	900	Ceiling		Group drive
18	16	Warpers, 510, 6-in.x4-in. spools	2	7½	50	900	Ceiling		Group drive

* Picker-type motors have waste-packed bearings.

switch. For the spinning-frame service General Electric P-10 switches were installed for shipper-rod operation.

The four-frame drives consist of a motor directly connected through a flexible coupling to a countershaft which is carried by two special high-speed hanger bearings. The motor and hanger bearings are mounted on a special structural-steel support made of channel irons placed back-to-back with metal spacers between them. Smaller channels fastened by corner angles are used for cross braces. The supports are secured to the ceiling by bolts passing between the side channels and held in inserts cast in the under side of the floor slab. The distribution of the load over a considerable area gives a good factor of safety.

No countershaft is used in the two-frame drives, and the motors are installed without bases. Connections to motors are made by flexible metallic conduit from the rigid-conduit line nearest the motor. One of the accompanying illustrations shows how successfully the installation was accomplished without interference between sprinkler piping, motor supports and conduit.

Starting compensators for the larger motors are mounted on columns and are furnished with overload inverse-time elements and no-voltage releases. To meet the code requirement of an inclosed disconnecting switch between the line and the compensator, "Square D" unfused safety-type switches were used. The compensator relay panel and the disconnecting switch are mounted on angle irons resting on the floor and braced by cross-pieces and bands surrounding the columns. Rigid conduit and condulet fittings added to the neatness and compactness of the wiring. The conduit is held in place mainly by "VV" pipe clips.

Typical machine-drive data are given in Table II. The list does not include the power requirements of conveyors, humidifiers, elevators and card strippers. When these motors were ordered, the introduction of 50-deg. motors into the textile industry was just taking shape. Both 40-deg. and 50-deg. motors were purchased, but in every case where a 50-deg. motor was used it was selected so as to be 20 per cent larger than a 40-deg. motor would have been for the same service. This was considered necessary on account of the overloads experienced at times and because of the tendency of the ventilating ducts to plug with "fly" or lint. Lockwood, Greene & Company, engineers, Boston, designed and supervised the construction of the entire installation at the Bay State mills.

New Plan for Supplying Electric Service to Outlying Municipalities*

A Solution of the Problem of Establishing Uniform Rates and Regulations in Serving Small Neighboring Communities from the Lines of a City Central Station

By G. E. MILLER
Sales Manager Cleveland Electric Illuminating Company

THIS plan for supplying electric service to outlying municipalities was designed to take care of incorporated villages which are beyond the Cleveland Electric Illuminating Company's existing service lines and in territory which would probably be unprofitable for some years to come if the company made the investment within the village to supply the service desired. The municipal authorities and the citizens in such villages are persistent in their efforts to obtain electric service and are usually willing to pay either by putting up some money for the cost of building lines or by paying a higher rate for electric service. Yet generally these villages are sparsely settled, and the people appreciate that it would not pay the company to make the necessary investment to provide such service.

The company has a policy of making uniform rates for the same class of service in all territory which it serves, and we do not want to raise rates to take care of excessive investment. In cases of this kind, however, the rate which would have to be charged for electricity in order to show a profit on the investment would be so high as to prohibit the free use of service, and this we know is undesirable.

Our company has had on file with the Public Utilities Commission for some years a standard form of contract under which ordinary line extensions are made where consumers desire service beyond our existing lines. This provides briefly that the consumer put up the entire cost of making the extension and the company will refund the money thus deposited at the rate of $20 for each meter connected to the extension within a period of ten years. But that form of line-extension agreement is not applicable to the incorporated village because usually the amount of money involved in these latter cases is too much for the individual desiring the service to pay. However, where the municipality as a whole is willing to do the financing, a plan can be worked out satisfactorily. Because of limitations imposed by statute upon municipal corporations, however, in the conduct of their finances it was necessary to work out an agreement having these factors in mind.

VILLAGE EXTENSIONS

Having then a village willing to assume the cost of financing the distributing lines within its limits, we have worked out this plan. Under our method the village issues bonds, which is its only means of obtaining capital, and from the proceeds of the sale of such bonds pays for building the lines required and retains ownership of such lines. This ownership of the lines by the village is necessary because in the expending of bond money it must own something in return for the money it spends.

*A paper presented before the convention of the Sales Managers' Association held at Association Island, N. Y., July 24-26.

In order, however, to enable us to control the situation within the municipality, notwithstanding its ownership of the lines, the plan worked out involves the leasing of the lines by us, with an option on our part to buy the property at any time during the lease period.

The essential features are as follows:

1. The council of the village passes an ordinance authorizing and directing the village authorities to build a distributing system to supply electricity to its inhabitants and to lease this distributing system to the company. This ordinance embodies in it the specific form of lease which is to be entered into between the village and the company when the distributing system has been built.

2. When it has been decided that the village wishes to obtain service under this plan, we make a detailed survey of the territory to be covered, and from the survey make an estimate of the cost of building the distributing system in accordance with our standard specifications. This estimate is then used by the village authorities in order to determine the amount of bonds to be issued by the village for this purpose.

3. When the bonds have been voted and the money from the sale of bonds is available, a contract is entered into by the village authorities with either the company or an outside contractor to build the distributing system within the village according to our standard specifications which we supply to them.

4. When the construction work is completed, we execute the form of lease embodied in the ordinance referred to above and extend our own lines at our expense and make connection with the lines owned by the village.

5. We pay no rental for the use of the village lines under the lease, the consideration in the lease being that we maintain all of the property owned by the village at our expense and that we render our standard service within the village at our standard rates for similar service elsewhere in accordance with schedules on file with the commission.

6. The leasing of the village lines is for a period of ten years, and the lease carries with it an option on our part to buy the lines from the village at any time during the lease period at a price to be agreed upon with the village authorities at the time of exercising the option to buy, and in case of disagreement as to the purchase price this is to be fixed by arbitration.

7. The only investment we have in the village is for meters and distributing transformers. We agree to put these in at our expense, as obviously these are items which are apt to be changed from time to time, and as the village will have no organization to handle such details, we feel that it is desirable that we provide these at our expense.

8. After the completion of the initial installation of lines in the village, the latter must put up all the money required for additions that may be desired during the lease period to take care of new customers or extensions.

9. A new customer coming on is handled by us in the same manner as any application would be handled in any other territory up to the point where we have made a survey and estimate of the cost of making the connection to the new consumer. When this cost has been determined, the sales department fills out a card which is sent to the clerk of the village. This card gives a brief description of the work necessary to make the connection and the cost. If then the village desires to provide service for such new applicant, the card is returned, signed on the part of the village, with a check from the village for the amount of money involved, and when this is received by us the order is put through and executed by us and service is rendered in the usual manner.

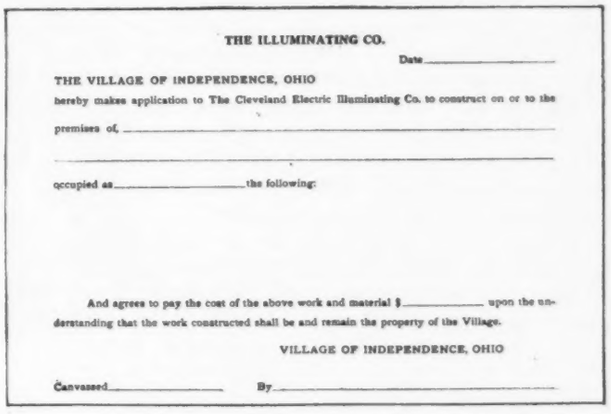
10. The lease makes provision for our connecting to the village lines should we desire to do so in order to provide service at some point beyond the village in question. The agreements now in effect provide that we pay the villages for the use of their lines in extending beyond the village limits. However, any future agreement of this kind that we make will not contain any provision for such compensation. In other words, we feel now that we should have the right to use the lines of the village for extending beyond if we desire to do so without paying it anything for such use, so long as we provide all of the service which the village desires.

11. In case street lighting is desired, the village must pay for all the equipment necessary to provide such lighting, and we then make a contract to supply the electricity, lamp renewals, glassware, maintenance, etc., charging therefor a flat price per lamp per year, depending on the size of lamp required. The charge is our usual suburban schedule for street lighting.

12. We have no franchise rights in these villages, and we will not take a franchise in territory which in our judgment is likely to be unprofitable, but the ordinance referred to under paragraph No. 1 automatically provides franchise rights within the village in the event of our exercising the option to buy the distributing system of the village.

DISCOURAGES MUNICIPAL OPERATION

It will be observed that under this plan the company has very little investment—only meters and transformers—within the village, and that the village as a whole pays by taxation the carrying charge of interest and sinking fund on the bonds to build the distributing system. This plan has the merit from our point of view of keeping down excessive investment, and at the same time it enables us to provide service in incorporated territory where the people are willing to carry the investment charge on the municipality as a whole. It further has the merit of preventing municipal ownership as such, because we have the right at any time within the lease period to buy the lines owned by the village.



THE ILLUMINATING CO.

Date _____

THE VILLAGE OF INDEPENDENCE, OHIO

hereby makes application to The Cleveland Electric Illuminating Co. to construct on or to the premises of, _____

_____

occupied as _____ the following:

And agrees to pay the cost of the above work and material $_____ upon the understanding that the work constructed shall be and remain the property of the Village.

VILLAGE OF INDEPENDENCE, OHIO

Canvassed _____ By _____

METHOD OF ESTABLISHING SERVICE TO CUSTOMERS IN OUTLYING COMMUNITIES

This card is sent to the village clerk whenever an application is received for service to some new consumer, and authority is secured to make the connection at the expense of the village.

If the territory in question should develop within a period of ten years to a point where it is self-sustaining, or if for any other reason we should desire to own these lines, we can readily obtain ownership. We would be just as willing to take over that investment under the provision of the option in the lease as we would be to spend our money for any other growth of business. If, on the other hand, the territory does not build up and at the end of the ten years is still unprofitable, we will have to face the problem as it presents itself at that time. In the meantime we have no investment there which cannot readily be removed.

Within the past year we have connected up two villages under this plan, both of which have now been operating for some months, and we are working on several others along the same lines. Thus far we have seen no difficulties whatever, and we do not anticipate any of serious moment.

Letters from Our Readers

A Place Set Apart for Suggestions, Comments and Criticisms, to Which All Men of the Electrical Industry Are Cordially Invited to Contribute

How Shall Electric Motors Be Applied?

To the Editors of the Electrical World:

Although the majority of engineers are willing to concede the fact that electric motors are superior to all other methods of furnishing power to machinery, nevertheless the fundamental ideas as to how they should be applied to obtain maximum efficiency differ considerably among various groups of individuals.

At the present time, in the opinion of the writer, the best method of applying electric motors to machinery is to build them into the unit rather than simply to attach them with the aid of a bracket and coupling.

As a general rule, when an electric motor is built integral with any machine of whatever nature the unit thus created is automatically simplified and becomes more efficient, from whatever angle the proposition is viewed.

Any sincere student of economics knows that for the manufacturers to assume they will lose ultimately by following this idea in fabricating their respective products is a fallacy, because the increase in business gained in markets made more productive by the use of this new type of unit will more than compensate in a very short time for temporary losses.

To the writer it appears as though many motor manufacturers and machinery builders, for the time being at least, are alike oblivious to the opportunities thus presented to them to increase the sale of their product.

JOHN J. BROPHY,
Electrical Engineer.

The Turner Tanning Machinery Company,
Peabody, Mass.

Compares Power Factor and Property Investment Rates

To the Editors of the Electrical World:

The economic importance of correcting low power factor is emphasized by Messrs. Doran, Hodtum and Fryer in their interesting and instructive article in the *Electrical World* of May 6. One of the conclusions drawn by the authors, however, is misleading. Calculating a particular billing demand by two different methods, they apparently show "a net loss on the demand rate with power-factor correction as compared with a power-factor rate considering property investment of $12,684, or 23 per cent." For convenience these two methods will be referred to as "power-factor" and "property-investment" rates respectively. The net loss of 23 per cent in this case is attributed to the "power-factor" rate. While the "power-factor" method may not be so elegant or so accurate as the "property-investment" method, the difference in the two methods is slight and certainly not of a 23 per cent magnitude.

A few figures will serve to illustrate this point. The billing demand by the "power-factor" method was arrived at by using a standard power factor of 75 per cent. Thus: $2,800 \times 75 \div 61 = 3,443$ units to be billed.

In obtaining the billing demand for the "property-investment" method, they boost the units to be billed to 4,550 by the simple expedient of: $2,800 \times 100 \div 61 = 4,550$.

Naturally, a larger bill will result, but it is not due to the application of the "property-investment" method, but rather to the use of a 100 per cent standard power factor in place of the 75 per cent. In other words, the authors have introduced two variables into their illustration, making the conclusion obscure.

To emphasize the fact that there is much less inherent difference between the two methods than their figures show, I have refigured the demand charge by the "power-factor" method, after substituting a 95 per cent standard power factor (now enforced by some of the central-station companies):

$$2,800 \times 95 \div 61 = 4,360 \text{ units.}$$
$$500 \text{ at } \$18 = \$9,000,$$
$$3,860 \text{ at } \$15 = \$58,000,$$

giving a total yearly demand charge of $67,000. Paraphrasing the author's conclusion, this shows a net *gain* on the "power-factor" rate, as compared with the "property-investment" rate, of $1,171, or about 2 per cent.

L. H. RITTENHOUSE,
Professor of Engineering.

Haverford College,
Haverford, Pa.

A "Controlled Jobber" Presents His Case

To the Editors of the Electrical World:

I have read with interest the article on "The Small Manufacturer's Pressing Distributing Problem" which was published in the *Electrical World* the other week. Probably this article represents the position of certain manufacturers—for instance, the manufacturer of transformers, motors, meters or fan motors. However, I do not believe that it correctly states the case for all so-called outside manufacturers, nor do I believe the condition of the small manufacturer would be materially changed if the big manufacturers had never gone into their present policy of distributing their products through certain jobbers.

My company is a Westinghouse agent-jobber, classed by the author of your article as a "kept" jobber. However, this company is ready at all times to entertain propositions from so-called outside manufacturers to sell their products, and the fact that we are "kept" jobbers would very seldom interfere in any way with our making a deal with the other manufacturers. The points to be considered would be the quality of the product, whether it duplicated lines already handled, prices, the general selling policy, and so on.

As a matter of fact, the business of this company done with the Westinghouse company is only a small fraction of its total.

The function of the jobber is selling, and to be a successful seller his organization must sell *something*—not merely warehouse everything that comes along and offer it for sale to the trade. Under that policy, which this company follows to a greater or less extent, it is very often impracticable to take on the product of more than one manufacturer of a certain article or line. This policy applies especially, of course, to appliances and apparatus, more than to ordinary standard supplies, although we are beginning to believe that it is poor business to carry duplicate lines of ordinary supplies in which there is practically no difference except in the trademark or manufacturer's name.

A "CONTROLLED JOBBER."

Industrial and Station Practice

Installation, Operation, Test and Repair of
Generating and Distribution Equipment and Methods of Economically Utilizing
Electrical Energy in Mills and Factories

Small Breakers Replace Fuses in Holland

WHILE on a tour through Europe recently I observed the extensive use of a miniature circuit breaker on domestic and industrial circuits, feeding lamps, small motors and various small-capacity energy-consuming devices. With its cover on it has the appearance of an ordinary rotary snap switch. Its diameter is the same, and its height exceeds that of the average one in use by only about 1½ in. It is adjustable for loads from 6 amp. to 25 amp. and insulated to operate on circuits of not over 250 volts.

A particularly attractive feature of this device is the way in which it is reset after tripping on overload or short circuit on the line. When the breaker is set, an indicator, which can be seen through a small opening in the front of the cover, shows black. On tripping it changes to red. A simple quarter turn to the right and back to the left resets the breaker. Nothwithstanding its compactness and simplicity, it has proved itself over and over again under very considerable overloads, without in any case failing to open the circuit instantly and effectively.

In Europe this little circuit breaker has long since passed the experimental stage and is used on many of the municipal electric power-supply systems. In such cases it is taking the place of the main fuse at the point where the cable enters the house and is mounted, together with the meter, on a little panelboard. As the installation up to this point invariably belongs to the supply company, the breaker is sealed and cannot be tampered with. This allows the customer to reset the breaker, but makes it impossible to touch the adjustment, which incidentally makes it possible to prevent exceeding a specified maximum demand contracted for, without in any way interfering with the protective duties of the device.

The circuit breaker is being installed in this position by the municipal electric light and power systems of Amsterdam, Rotterdam, The Hague, Utrecht and all the other larger systems in Holland, including the privately owned district central stations of Gelderland, Brabant, Groningen, etc., on all new residence installations. For places beyond this

MINIATURE BREAKER USED EXTENSIVELY IN EUROPE

point of entry they are just as extensively used for all separate circuits and in this case are mounted in groups of two, four, six, eight, etc., on suitable cast-iron bases. There is practically nothing in the working parts of this simple ingenious device that can get out of order. Every part can be made in simple operations and the assembling can be done by unskilled labor.

The advantage of its use is easily imaginable when one thinks how often fuses blow at the most inopportune time and usually when one has not taken the precaution of having a supply of spare fuses on hand. It might be added that this little breaker has found a very ready market in all European countries

J. M. VAN NIEUKERKEN.

Cochranton, Pa.

Record Boiler Efficiency in 60,000-Kw. Plant

SOME figures on the boiler-room performance of the Colfax station of the Duquesne Light Company at Cheswick, Pa., are given in the accompanying tabulations. These figures are taken from the daily operating records over a period of four months from October, 1921, through January, 1922. A recapitulation of the records from August last year through January (Table II), shows that during these months the average boiler efficiency was 77.5 per cent. About 9.11 lb. of water was evaporated for each pound of coal, which averaged 13,182 B.t.u. per pound. While the results are good, they do not represent the best performance possible. Further improvement is to be expected as the operating force becomes more familiar with the equipment.

The Colfax station has a rated output of 60,000 kw. This plant was described in detail in the *Electrical World* for April 2 and 16, 1921, pages 753 and 865 respectively. The station is designed for base-load operations, and under present conditions it is possible to maintain a load in excess of 50,000 kw. for most of the day. For the night periods, from about midnight until 7 or 8 o'clock in the morning, the load may fall as low as 30,000 kw.

TABLE I—BOILER-ROOM OPERATION DATA FOR DECEMBER, 1921, IN THE COLFAX STATION

Boiler No.	Lb. Water Evaporated	Lb. Coal Consumed	Hours Active	Efficiency, per Cent	Rating, per Cent	Exit Gas Temp., Deg. F.	CO_2, per Cent	Combust. in Refuse, Per Cent
0	60,020,000	6,638,060	559	76.6	172	489	9.9	26.67
2	55,291,000	6,089,230	480	76.9	185	482	12.0	26.89
3	75,435,000	8,319,030	696	76.7	174	460	10.3	28.60
4	75,542,000	8,324,290	691	76.8	175	481	11.9	25.71
5	32,242,000	3,519,710	285	77.5	183	...	11.5	29.55
6	73,474,000	8,138,360	688	76.5	171	479	11.7	26.88
7	70,546,000	7,761,900	640	77.0	171	481	11.0	27.18
Total	442,550,000	48,790,580	4,038	76.8	176	478	11.2	26.99

Average superheat, 132 deg. F.; Average feed temperature, 193 deg. F.; Average B.t.u. in coal, 13,283 per pound.

TABLE II—AVERAGE BOILER-ROOM FIGURES FOR SIX-MONTH PERIOD IN A 60,000-KW. PLANT.

	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Average
Average water per pound of coal, lb.	9.07	9.47	9.23	9.18	9.07	8.73	9.11
Average feed temp., deg. F.	208	210	203	204	193	204	204
Average superheat, deg. F.	124	120	127	127	132	136	128
Average B.t.u. in coal per lb.	13,093	13,180	13,159	13,198	13,283	13,177	13,182
Average efficiency, per cent	76.4	78.9	78.0	77.2	76.8	77.6	77.5
Average rating, per cent	154	167	187	167	176	168	170
Average exit gas temp., deg. F.	466	460	465	467	478	471	468
Average CO_2, per cent	9.2	9.3	9.6	10.3	11.2	11.1	10.1

TABLE III—AVERAGES OF HEAT BALANCE FIGURES FOR FOUR MONTHS THAT ARE WORKED OUT DAILY.

	October		November		December		January	
Coal as fired, B.t.u. per lb.	13,159		13,198		13,283		13,177	
Ash, as fired, per cent	9.28		9.37		9.14		9.05	
Moisture, as fired, per cent	4.45		4.12		3.91		4.49	
Inlet air temperature, deg. F.	70		70		70		70	
Exit gas temperature, deg. F.	465		467		478		471	
CO_2, per cent	9.6		10.3		11.2		11.1	
Combustible in refuse, per cent	26.36		29.10		26.99		26.76	
	B.t.u.	Per Cent	B.t.u.	Per Cent	B.t.u.	Per Cent	B.t.u.	Per Cent
Heat absorbed by boilers	10,264	78.00	10,189	77.20	10,202	76.8	10,225	77.60
Moisture loss	55	0.42	51	0.38	48	0.36	56	0.42
Hydrogen loss	545	4.14	547	4.14	522	4.16	548	4.15
Stack loss	1,713	13.02	1,585	12.01	1,522	11.46	1,502	11.40
Ash-pit loss	482	3.66	558	4.23	490	3.69	479	3.64
Heat accounted for	13,059	99.24	12,930	97.96	12,814	96.47	12,810	97.21
Heat unaccounted for	100	0.76	268	2.04	469	3.53	367	2.79
Total	13,159	100.00	13,198	100.00	13,283	100.00	13,177	100.00

When the plant was first put in operation difficulty was encountered with clinkering, which was due in part to periods when there was pressure over the fires and in part to improper water distribution in the clinker pits. Particular care is now taken to maintain a furnace pressure below atmosphere at all times, and the water distribution has been improved, with the result that clinker trouble has been virtually eliminated. The formation of clinker on the surface walls is prevented by air cooling, Bernitz and Drake blocks being used. These blocks did not altogether prevent clinkering on the side walls. Then side-wall tuyères were installed and these have about done away with clinkering on the side walls. The amount of combustible in the ash is high, varying from 26 per cent to 29 per cent (Table III), but the necessity for early quenching of the ash to prevent clinker makes improvement in this respect doubtful. In the light of over-all efficiency the slight excess in combustible is a lesser loss than the formation of hard clinker masses would occasion.

Furnace temperatures vary from 2,500 to 2,800 deg. F. At the top of the first pass this approximates 1,000 deg. F., between the second and third passes it is 530 deg. F., and the exit gas temperature varies from 450 deg. to 480 deg., usually being about 470 deg. F.

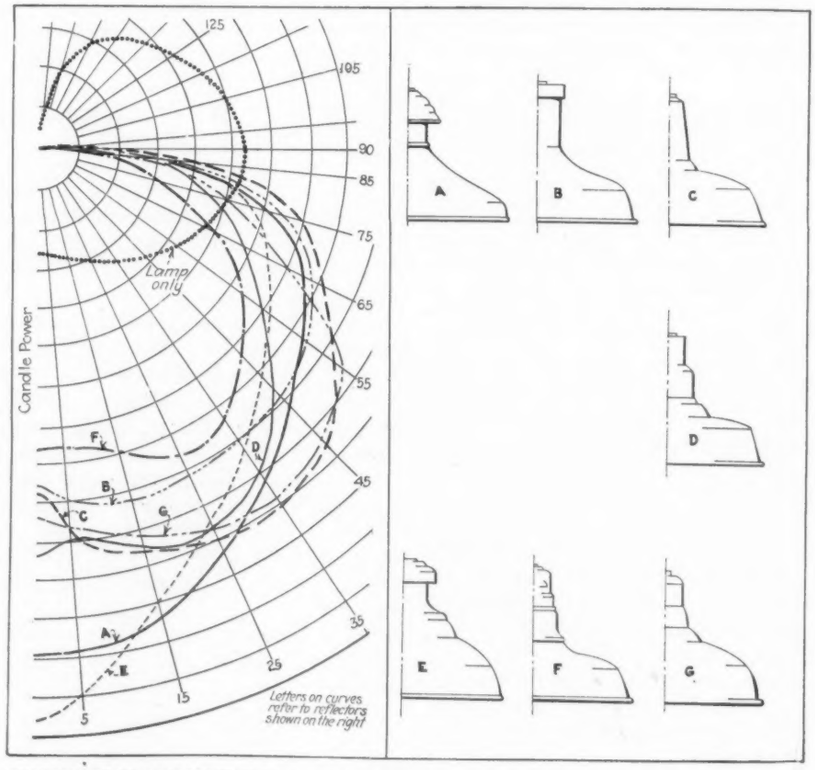
C. W. E. CLARKE,
Power Engineer.
Dwight P. Robinson & Company,
New York, N. Y.

Wide Variations in Light Distribution of R-L-M Dome Reflectors

TESTS made on seven standard types of R-L-M dome reflectors revealed some interesting variations in their light distribution. The curves, superimposed on polar co-ordinate paper for comparison, are shown in the accompanying illustration. At the right of the curves the general outlines of the different reflectors are reproduced. It may be noted that there is quite a variation in their shapes. The reflectors were secured for use with 400-watt Mazda-C lamps. As the different shapes seemed to indicate a wide variation in the light distribution, tests were made in a dark room by means of a photometer. The results were an even greater difference in the candle-power characteristic curves than was at first anticipated.

A comparison of the mechanical, thermal and illuminating characteristics of each of the seven reflectors is given in the table. The temperature rise in each case is without ventilation. Tests of a few of the reflectors showed that ventilation caused a decrease or an increase in the temperature rise at the socket depending upon the make of the reflector with its particular type of ventilation.

In industrial applications, as well as in many other cases, the mechanical design of the reflector is of great importance. It may be of greater or lesser importance than the illumination characteristic either in an industrial reflector or an artistic fixture depending upon the application. The items for engineering



DISTRIBUTION OF LIGHT FROM THE REFLECTORS ON THE RIGHT SHOW WIDE VARIATION

MECHANICAL, THERMAL AND ILLUMINATION COMPARISONS OF RLM STANDARD DOME REFLECTORS

Reflector	A	B	C	D	E	F	G
Condition of enamel	Slightly Pitted	Pitted Spotted	Good	Pitted Spotted	Heavy Good	Slightly Pitted	Slightly Pitted
Cracking of enamel under slight pressure at largest diameter	Cracked at center	None	None	Cracked at edge	None	None	Slight
Relative illumination	3	5	2	4	6	7	1
Socket	Light 1-piece	Heavy 2-piece	Light 2-piece	Heavy 2-piece	Heavy 2-piece	Heavy 2-piece	Very heavy
Temperature rise, deg. F.	81	94	75	68	78	77	64
Insulation falling from wires upon socket	Slight	Yes	Yes	Slight	Slight	Slight	Slight
Socket held from turning	No	Yes	Yes	No	No, but room for hand	Yes	Yes
Weight in pounds	4	6	4	4	9½	5	4½
Nut	Light	Heavy	Light	Heavy	Light, heavy cast iron cap	Light	Heavy cap
Number of pieces	2 steel 2 copper	One	One	Two	1 steel 1 cast iron	Three	2 steel 1 cast iron
Gaskets	Steel Fiber	Rubber Asbestos	Fiber	Rubber	Brass Lead Cork	Copper Lead	None
Reflector rolled	Over	Under	Under	Under	Over, but well filled	Over	Under

consideration of an industrial reflector, after that of illumination, are: construction of lamp socket, temperature rise at socket, ease of installation, strength, weight, etc. The reflection of the maximum amount of useful light to the working plane depends upon the quality of the enamel as well as the shape of the reflector. Most maintenance trouble is found in the sockets, due to failure of the porcelain or current-carrying parts. Some reflectors are so hard to wire, especially when used with disconnecting hangers, that valuable time is lost upon installation and when making repairs.

D. W. BLAKESLEE,
Electrical Engineer.
Jones & Laughlin Steel Company,
Pittsburgh, Pa.

Hard-Drawn Rods Used for Arc Welding

HARD-DRAWN rod electrodes of either one of the specifications shown in the table have been standardized by a leading industrial concern on the Pacific Coast. These rods

SPECIFICATIONS FOR ARC-WELDING ELECTRODES, IN PER CENT

	A	B
Carbon	Not over 0.06	0.13—0.18
Manganese	Not over 0.15	0.40—0.60
Phosphorus	Not over 0.04	Not over 0.04
Sulphur	Not over 0.04	Not over 0.04
Silicon	Not over 0.08	Not over 0.06

are used on mild steel, structural shapes, plates, bars, low-carbon forgings and castings. For arc welding on high-carbon and alloy steels special electrodes are used. On high-carbon steels where the weld is not to be machined but a hard wearing surface is the principal consideration electrodes containing 0.95 per cent carbon are used. If the welds must possess unusual density and uniformity in order to secure a high polish or be easily worked, covered nickel-steel electrodes are recommended for use on high-carbon steel.

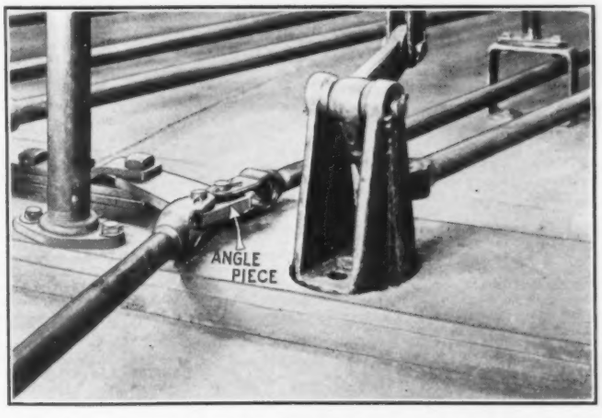
D. N. LOUIS.

San José, Cal.

Bell-Crank Lever Operates Switch at an Angle

CHANGES in the oil-switch layout of the Sewall Street substations of the Cumberland County Power & Light Company, Portland, Me., required the use of an angle piece, shown by the arrow in the accompanying illustration, to change the direction of pull on the lever to meet the requirements of switch location. The bell-crank lever between the switch and the operating handle is not in a straight line, making it necessary to use two levers in the manner shown. Properly to change the direction of pull the pivoted angle piece to which the lever eyes are clamped by brass pins suitably cottered was provided, care being taken to avoid lost motion and still to secure easy movement. The angle piece in turn is pivoted to a floor clamp shown behind the pipe on the left-hand side of the illustration. This clamp is made of strap iron 1½ in. wide and ¼ in. thick. The top and second straps form a U which is spread sufficiently to permit full play of the lever. The arrangement has been most effective under the restrictions of a closely occupied switchboard and bus structure.

FIELD EDITOR ELECTRICAL WORLD.
Boston, Mass.



HOME-MADE ANGLE PIECE DEFLECTS PULL ON CRANK LEVER

Better Power Factor by Transformer Taps

BY CHANGING the taps on the secondary of the transformers supplying rotary converters the power factor of the machines was changed from lagging to leading, bettering the power factor of the total load of the Gulfport plant of the Gulfport & Mississippi Coast Traction Company by approximately 10 per cent.

There were two 500-kw., 600-volt converters in this plant, which previously operated with a power factor ranging from 60 per cent to 8[illegible] per cent lagging. Lower taps were brought out on the secondaries of the transformers, so that with 2,3 volts on the primary the secondar[illegible] voltage was just sufficient to produce 600 volts on the direct-current

TABLE I—RATE SCHEDULES FOR URBAN AND RURAL SERVICES ON FOUR ILLINOIS UTILITIES

	Bloomington & Normal Railway & Light Co.		Illinois Northern Utilities		Canton Gas & Electric Co.		Central Illinois Public Service Co.	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Number of consumers	678	88	585	41	2,792	88	1,166	26
Miles of pole line	12.86	38.375	8.9	15.8	21.73	31	26.36	4.92†
Customers per mile of pole line	52.8	2.4	66	2.6	128.5	2.84	44.23	5.28
Total line transformers	32	72	60	24	108	66	110	22
Total kva. capacity of transformers	191	131	419	80.5	865.5	154	744.5	81.6
Customers per line transformer	21.2	1.22	9.7	1.7	25.8	1.33	10.6	1.18
Average transformer kva. per customer	.282	1.49	.72	1.96	.307	1.75	.64	3.14
Transformer core loss, kw.-hr. per year per customer	19.53	207.8	46.78	173.12	18.99	248.4	42.06	309.92
Average distribution line cost per customer*	$56.40	$533.10	$71.60	$468.90	$48.87	$510.25	$86.91	$452.09
Average yearly revenue	$38.91	$34.95	$37.66	$39.97	$28.60‡	$51.16	$45.24	$30.31
Maintenance of distribution system	$0.505	$3.69	$0.388	$6.595	$0.495	$6.54	$0.396	$14.31
Inspecting and testing meters	$0.120	$0.29	$0.436	$0.872	$0.245	$0.432	.....	.....
Removing and resetting meters	.....	.....	$0.083	$0.166	$0.176	$0.176	.....	.....
Meter reading	$0.336	$0.931	$0.550	$2.44	$0.346	$1.36	$0.325	$2.99
Collecting accounts	$0.367	$0.367	$0.600	.....	.....	.....	$0.57	$0.57

* Average costs are on present-day prices. † Primary lines run on high-tension; pole lines are excluded. ‡ Municipal light and power consumers are omitted.

side of the converters with all the field resistance cut out. This brought the range of the power factor control of the machines to between 90 per cent leading and unity. Before the change the field rheostats would very often burn out, whereas now no trouble has been experienced.

A. G. RIDDICK,
Electrical Engineer.
Gulfport & Mississippi Coast Traction Company,
Gulfport, Miss.

Cost Study Must Be Made in Giving Rural Service

SOME of the excess costs of rural service over urban service were recently brought out by Walter A. Shaw in a hearing before the Illinois Commerce Commission. The hearing was concerned with the rules under which service to farmers shall be given and the study submitted by Mr. Shaw covered the actual conditions on a number of situations in the state. The final results of the investigation as to actual figures covering both urban and rural service are shown in Table I.

It may be seen from this table that the average distribution line cost per customer is from five to ten times as much for rural as for urban service, while the yearly income from both is practically the same. Maintenance of the rural distribution system and the annual core loss are also very much greater. The latter is calculated from the known characteristics of the transformers installed. The investment costs per consumer are on a basis of present-day costs and represent the comparative investments for urban and rural consumers under conditions as they exist.

The operating-cost figures are on a yearly basis and represent those that could be got directly from the company records or deduced from those records. The lines selected are from companies in different parts of the state and are typical of the whole state. In each case the urban and rural service is from the same power sources. In the same case E. W. Carrier of the Illinois Traction System submitted studies on the systems of two small utilities—one at Galva, Ill., and the other at Atlanta, Ill.—showing the conditions as affecting both urban and rural service. For Galva the number of consumers, the transformers with their rating, core losses and annual sale of kilowatt-hours, as well as load factors for rural and urban consumers, are given in Table II. Large industrial and power consumers are omitted in order to obtain comparable results. Table III shows the results of a year's operation on one set of consumers at Atlanta that exhibits an extreme case of operating trouble due to weather conditions. The revenue figures in general represent the effect of attempting to give rural service without a complete study of costs and the establishment of inadequate rate of schedules.

FIELD EDITOR ELECTRICAL WORLD.
Chicago, Ill.

TABLE II—COMPARATIVE TRANSFORMER CORE LOSSES BETWEEN RURAL AND URBAN COMMUNITIES

Location of load	Rural			Urban Towns on Transmission Line									Town	Urban Towns
	1	2	Total	1*	2	3	4	5	6*	7	8	*Total	9*	*Total
Number of consumers	56	82	138	429	191	102	70	12	143	87	132	1,166	649	1,815
Number of transformers	40	62	102	26	4	2	1	1	2	12	1	49	25	74
Capacity transformers, kva.	52	67	119	140.5	60	15	10	5	30	38	15	313.5	153.5	467
Annual core loss, kw.-hr.	9,864	14,016	23,880	10,140	4,200	1,104	732	444	1,968	3,396	1,056	23,040	10,500	33,540
Monthly core loss per consumer, kw.-hr.	14.7	14.3	14.5	1.97	1.84	0.90	0.89	3.09	1.15	3.25	0.67	1.65	1.35	1.54
Annual energy sold, kw.-hr.	.....	.....	28,777	.....	.....	.....	.....	.....	.....	.....	.....	356,865	217,869	574,734
Average monthly energy sold per consumer, kw.-hr.	.....	.....	17.4	.....	.....	.....	.....	.....	.....	.....	.....	25.5	28.0	26.4
Ratio core loss to energy sold	.....	.....	1:1.2	.....	.....	.....	.....	.....	.....	.....	.....	1:15.5	1:20.7	1:17.2
Load factor, per cent	.....	.....	2.6	.....	.....	.....	.....	.....	.....	.....	.....	13.0	16.2	14.1

* Large power consumers are omitted to make the figures comparable.

TABLE III—HIGH COST OF RURAL SERVICES SUPPLIED BY ATLANTA (ILL.) ELECTRIC LIGHT AND POWER COMPANY

All customers are on one line tapped from a 6,600-volt, single-phase line between Atlanta and McLean, Ill. The average core loss per customer per month is 32.4 kw.-hr. These data were furnished by Mr. Robinson, manager of the Atlanta (Ill.) Electric Light & Power Company. The expense to the company covers only destroyed fuse boxes, lightning arresters and burned-out transformers. No line trouble or ordinary maintenance and no operating expenses of any kind are included. To cover all of these costs just mentioned, $161.57 is available after deducting extraordinary maintenance.

Consumer	A	B	C	D	E	F	G	H	I	J	Total
Annual consumption, kw.-hr.	270	390	375	119	398	323	345	1,562	1,061	1,335	6,224
Annual gross revenue	$37.74	$54.62	$47.65	$22.20	$54.65	$47.62	$48.85	$144.29	$119.11	$141.84	$718.57
Transformer capacity, kva.	3	2	2	2	2	2	5	*4.5	2	2	26.5
Annual core loss, kw.-hr.	377	342	342	342	342	342	473	648	342	342	3,892
Ratio of core loss to energy sold	1:0.8	1:1.2	1:1.1	1:0.3	1:1.2	1:.09	1:.07	1:2.4	1:3.1	1:3.9	1:1.6
Load factor, per cent	1.03	2.23	2.14	0.68	2.25	1.85	.79	3.96	6.05	7.62	2.68
Annual damage to Company's equipment due to storms and lightning	$58.00	$58.00	$58.00	$18.00	$58.00	$83.00	$58.00	$148.00	$18.00	.....	$557.00

* One 3-kva. and one 1½-kva. transformer.

New Books

Reviews of the Latest Contributions to
Technical, Industrial and Commercial Literature of Particular Interest
to Members of the Electrical Industry

Electric Ship Propulsion

By Commander S. M. Robinson, U. S. N. New York: Simmons-Boardman Publishing Co. 274 pages, illustrated.

Commander Robinson has been intimately associated with electric ship propulsion for about ten years, as a post-graduate student at Annapolis and later at Schenectady, as chief engineer of the Jupiter, as specialist in the Bureau of Steam Engineering, as fleet engineer serving on board the New Mexico, and again in the Bureau of Steam Engineering during the development of the latest details of improved designs. Because of his intelligence, study and experience he has the best qualifications for telling the story. The excellence of his book is therefore no surprise. It correctly evaluates the different methods available for ship propulsion and shows their relations. It gives the characteristics of all the different types of machinery which have been used, this being the record of a vast amount of study and experimentation. It shows most of the details of actual machinery used in all the principal applications of electric propulsion which have been made and gives a good idea of the results accomplished. This book imparts information which might be used to improve greatly the art of ship propulsion. It has been produced with great care and thoroughness by a very busy man and deserves high commendation.

Handbuch der Drahtlosen Telegraphie und Telephonie

By Eugen Nesper. Berlin: Julius Springer. Two volumes, 1,253 pages, 1,321 illustrations.

This book is an ambitious review of the history and development of radio communication and contains much material of interest and value to workers in the field. Although the volumes are in German, even a smattering of that language will enable a radio engineer to dig out much useful information. The bibliographical classfication of patents and other publications, covering sixty-four pages of the second volume, is especially interesting. The general plan of the author is to devote the first volume to principles of operation and the second to the design of apparatus. The treatment of the subject is so nearly complete that to reprint the table of contents or to mention the subjects taken up would be to list by name almost all the subdivisions of the radio art.

There seem to be comparatively few important errors. The chart on page 19, indicating Hertzian and radio waves as having lengths above zero millimeters and heat waves, light waves, etc., lengths less than zero millimeters, should be corrected. In some particulars the author appears to have been misinformed or biased on historical matters, but there is evidence of a much closer approximation to impartiality than in earlier works on radio by German writers. The books are a worthy addition to any radio library both for study and for reference. Presswork, paper and binding are excellent.

Radiophone Receiving

Erich Hausmann, editor. New York: D. Van Nostrand Company. 179 pages, illustrated.

With public interest in the radiophone has come a demand for a description of what can be expected from it and how the apparatus functions. In this book, which has an introduction by Prof. Michael I. Pupin, Prof. Alfred N. Goldsmith tells how radio telephoning is accomplished, and Prof. Erich Hausmann how the simple receiving circuit is tuned. Receiving by the use of the crystal detector is described; John H. Morecroft tells about the vacuum tube; Robert D. Gibson and Paul C. Hoernel about amplifying music or speech; Prof. L. A. Hazeltine about regenerative reception, and there is a chapter on radio-telephone broadcasting by John V. L. Hogan. The stated purpose of the volume is to describe in a simple manner the methods and apparatus used for the reception of radiophone speech and music. Although intended for popular reading, the authors have succeeded in producing a work that can be profitably read by the engineer who wishes to get a broad view of the subject before taking up studies of a more technical character. The usual far-fetched analogies to explain the action of the electrical current in the radiophone receiver are avoided. The vacuum tube and its use as a detector, amplifier or regenerative receiver is covered in a way that will help the reader quickly to grasp the more technical studies that he may have to undertake. The book has none of the trashy character of so much of the radio literature floating about and it gives evidence of considerable effort to make a worth-while piece of literature.

Telephonic Transmission

By J. G. Hill. London and New York: Longmans, Green & Co. Eight volumes, 398 pages, illustrated.

The above volume has more of the nature of "collected papers" than of a "textbook." If the treatment in places appears to lack some of the characteristics one expects to find in a handbook of so broad a title, this must be explained by the richness of the author's original contributions to the art, which makes it difficult to crowd in other matter without giving too much bulk to the volume. The author is a specialist on loaded telephone lines, and the reader will especially appreciate an instructive series of chapters on the theory and practice of loading. The author's fine method of determining the conditions of optimum load is described, and there is also a valuable résumé of loading practice in Great Britain and other countries. A good deal of attention is devoted to methods of using a "standard cable" for transmission measurements and talk tests, and all through the book the author adheres to the old method of expressing transmission losses in terms of "standard cable miles." In an interesting chapter on voice composition a number of sound oscillograms are presented, and the question of average speech frequency is taken up. An original analysis of certain cost problems in telephony and a few pages on telephonic measurements are features, and there is included at the end a description of some of the first attempts of the British Post Office to apply thermionic tubes as telephonic amplifiers. This institution, and Sir William Strugo, are indeed to be congratulated on the good start thus made with the "Manuals of Telegraph and Telephone Engineering," of which series the present volume is number one.

Books Received

Switching Equipment for Power Control. By Stephen Q. Hayes. New York: McGraw-Hill Book Company, Inc. 454 pages, illustrated.

Burning Liquid Fuel. By William Newton Best. New York: U.P.C. Book Company, Inc. 332 pages, illustrated.

A Course in Electrical Engineering. Volume II—Alternating Currents. By Chester L. Dawes. New York: McGraw-Hill Book Company, Inc. 512 pages, illustrated.

America's Power Resources. By Chester G. Gilbert and Joseph E. Pogue. New York: The Century Company. 321 pages, 38 illustrations.

Continuous Wave Wireless Telegraphy. By B. E. G. Mittell. London: Sir Isaac Pitman & Sons, Ltd. 110 pages, illustrated.

Automatic Telephone Systems. By William Aitken. New York: D. Van Nostrand Company. 882 pages, 211 illustrations.

Elektromotorische Betriebe. By Dr. Ing. A. Schwaiger. Berlin and Leipzig: Walter de Gruyter & Company. 117 pages, illustrated.

The Electrometallurgy of Steel. By C. C. Gow. New York: D. Van Nostrand Company. 342 pages, 132 illustrations.

Modern Methods of Welding as Applied to Workshop Practice. By J. H. Davies. New York: D. Van Nostrand Company, 263 pages, 132 illustrations.

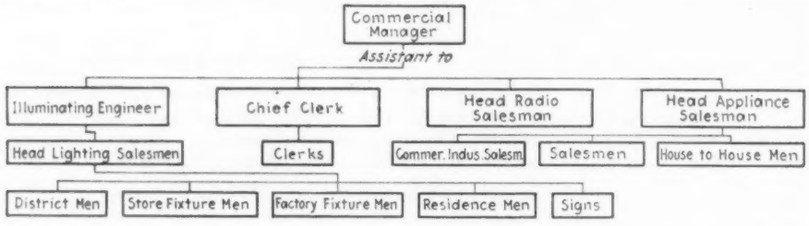
Central Station Business

Advertising, Selling and Service Methods
Commercial Organization and Management, Customer and Trade Relations, Public and Financial Policies, and Reports of Company Plans and Experiences

Building Up the Lighting Load*

How the Central Station's Sales Force Can Be Organized and Directed to Produce More Business

THE company with which I am associated has tried every feasible and legitimate scheme which has come to its attention for improving its organization and increasing the sale of electricity. The commercial manager in charge of building up lighting income must necessarily have to do with the sale of electrical appliances, as these have a very important bearing on the income of certain classes of the business, especially residential. I have given the man in charge of the entire commercial department the title of "commercial manager," as shown in the accompanying organization chart.



AN ORGANIZATION TO HANDLE A TERRITORY WITH WIDELY DIVERSIFIED INDUSTRIES

Lighting installations should be supervised by an illuminating engineer, he taking precedence over the man in charge of the lighting salesman. His duties should include the furnishing of blue prints and specifications, supervising all contracts turned in by the lighting salesman where there is a question of installing new or remodeling present equipment, keeping in touch with lamp, reflector, fixture and glass and other manufacturers concerned with lighting equipment, and distributing information obtained by this means to all lighting salesmen. The illuminating engineer should also prepare wiring specifications. There should be at his disposal a small laboratory where he can make photometric tests.

The head lighting salesman should be a field man, whose duties include the studying of future possibilities for increasing business, traveling with his salesmen and training them how to observe lighting equipment with an eye to improving poor installations, making notes of "prospects" and helping the salesmen to be efficient in every respect, thus increasing their earning power and making their position with the company an assured thing rather than a matter of a few months only. I have divided the work of the lighting department into five parts. As this is an age of specialization, men must be trained for a particular line of work, and they must have sufficient work to do in that particular line. The five divisions are:

1. District Salesmen.—The district men should take care of minor calls which come to the company each day. The average man can handle twenty calls a day. In their particular line they do not need to be students of illuminating engineering. They must, however, know the company's methods of doing business and must maintain a courteous attitude toward the public.

2. Commercial Salesmen.—Store-lighting salesmen must have a knowledge of illuminating engineering, as the central-station company should sell illumination and not fixtures. There has been little, if any, standardization of store-lighting equipment. The possibilities in this class of business are enormous; its growth depends upon the caliber of the men employed.

3. Factory Salesmen. — Factory salesmen must be of a higher type and have a greater amount of illuminating engineering knowledge than store-lighting salesmen. More work has been done to develop and standardize factory lighting equipment than in any of the other classifications. The whole matter rests with the salesmen to sell the factory owner the proper lighting equipment, the illuminating engineering division having previously prepared blueprints showing the right layout for a lighting system. This service is offered to all factories and stores.

4. Wiring Salesmen.—When we were in the wiring business we also furnished this service to all prospective residence customers. It is not our object to urge the "prospect" to purchase the fixtures and wiring from us; the service is rendered to promote the use of modern, scientifically designed equipment.

5. Maintenance Service. — We have found from surveys and investigation that if lighting equipment does not receive the proper cleaning service and other attention it will cost the customer about twice as much for electricity. That is, a fixture that is not cleaned will in thirty days reduce the lighting efficiency 40 per cent. I believe I am safe in saying that very few owners of factories or stores have their fixtures thoroughly cleaned once each month.

*Part of a paper presented by Oliver R. Hogue, head lighting agent Commonwealth Edison Company, at sales managers' convention, Association Island, New York, July 24-26, 1922.

Keeping Power Customers "Sold" on the Service

ON THE theory that an ounce of prevention is worth many pounds of cure in maintaining a high standard of service and satisfaction in customers' minds, the Denver (Col.) Gas & Electric Light Company has adopted the practice of calling on its large power users at stated intervals with a view to anticipating and preventing any cause for complaint. The plan was developed about two years ago by D. C. McClure, electrical superintendent, and differs

from the usual method of keeping in touch with customers in that it provides for the systematic and regular visitation of the large power consumers by members of the engineering, distribution and generating divisions of the electric department.

A schedule has been drawn up and so arranged that each member of the "visiting committee" is required to make a certain number of calls each month, and the schedule is rotatively arranged so that each man calls on every power user before a second visit is made to the same customer.

The system acts as a perpetual safety valve for the customer. Grouches are not allowed to accumulate, and the customer feels that there are some real human beings in the utility who are truly interested in giving service, because the callers have no goods to sell and receive no commission for the call.

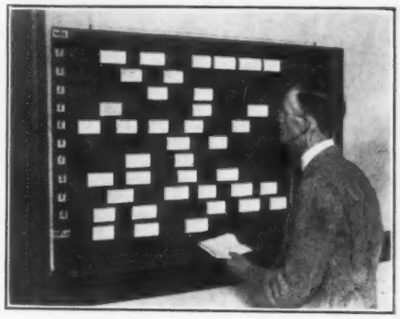
The benefits of good service and the bad effects of poor service are called directly to the attention of these key men of the operating department. It brings the truth home when a superintendent of an iron foundry leads the caller up to a pile of slag and says, vehemently, "See that pile of slag! That's what we got when we had to drop the bottom out of this cupola in the middle of a heat to avoid freezing it, when your power went off last Thursday. Several tons of good coke and iron utterly wasted."

On the other hand, it means considerable when the manager of a company hands the visitor a good cigar along with his thanks for getting his line up so promptly during the last blizzard.

The members of the visiting committee, being technical men, occasionally discover improper operation or poor conditions of the customers' equipment, and correcting the trouble there and then often eliminates a complaint.

Central Station Keeps Rent List for Customers

A LIST of "rents" available in the different wards of the city is maintained by the Hartford (Conn.) Electric Light Company for the convenience of the public. The list is filed on a bulletin board in the contract department, and has attracted appreciative visitors for many months. As a service to people who visit its offices, the company finds



UTILITY'S LIST OF HOUSES FOR RENT

this helpful information board a means of acquiring both popular good will and interesting the public in house-wiring and service matters generally.

Electrical Men Should Use More Large Appliances

THE crying need for electrical men to show the way in the use of electrical appliances, especially the larger ones, cannot be more strikingly emphasized than by a study of the accompanying data compiled by Rey E. Chatfield, secretary-manager of the Electric Service League of British Columbia. Of 175 queries sent out to members of the industry in Vancouver, replies were received from 105, showing an aggregate of 241 appliances in actual use. These are tabulated as follows:

	No. Used
Chafing dishes	2
Electric fans	6
Electric irons	79
Grills	20
"Hedlite" heaters	13
Immersion heaters	5
Percolators	15
Water Heaters	4
Ranges	8
Suction cleaners	19
Toasters	50
Warming pads	11
Washing machines	9
Total	241

This tabulation reveals some startling facts. Apparently out of these 105 electrical men not one has in his own home an electric refrigerator, dishwasher or ironing machine. Only nine use washing machines and only eight are using electrical ranges. There are nineteen vacuum cleaners used among 105 electrical men. That would indicate that they are less than 20 per cent sold on this one appliance. Even the two most generally used devices, electric flatirons and toasters, are far from being in use 100 per cent. The average number of appliances used by each of these 105 electrical men is only 2.29.

Here is a condition where every electrical man should "stand aside and watch himself go by." If he is such a poor customer for his own wares as these figures indicate, how can he expect to convince the housewife that she can profitably use five or six or more different electrical appliances? Central-station executives can help this situation to an appreciable degree by selling electric devices to employees on long extended payments at a price to cover cost. Some companies already have such a plan in effect, but those that have not, and the contractor-dealers also could well afford to adopt it.

What Other Companies Are Doing

Chicago, Ill. — Electrical energy output at the operated public utility properties of the Standard Gas & Electric Company during the week ended July 8, 1922, increased 7.8 per cent over the corresponding week of 1921. Applications were received for 1,969 new electric services, covering 894 kw. of lighting and 1,424 hp. in motors. Connected load reports show a net gain of 321 consumers, with 516 kw. of lighting and 170 hp. in motors.

Providence, R. I.—New Lighting meters contracted for in commercial and residential installations during the first seven months of 1922 on the system of the Narragansett Electric Lighting Company totaled 2,284, a gain of 37.1 per cent over the same period in 1921. For the first six months of the current year the value of house-wiring contracts totaled $172,167. The company's lighting department, headed by F. A. Gallagher, Jr., is now a month ahead of its "bogie" for this year to date. Steady soliciting by a staff of nine men is responsible for this gain.

Boston, Mass.—Electrical appliance sales by nine companies under the management of Charles H. Tenney & Company gained 66.5 per cent in May, 1922, compared with the same month last year, the total being $33,985 against $20,411. The Malden (Mass.) Electric Company sold $14,190 in appliances, topping the list, and the greatest proportional increase was attained by the Suburban Gas & Electric Company, Revere, Mass., whose sales rose from $417 to $2,753.

Digest of Electrical Literature

Including Brief Abstracts of and References to
Important Articles Appearing in the Scientific and Engineering Press
from All Parts of the World

Hydro-Electric Development and Steam Equipment

Hydro-Electric Plant in Partenstein, Austria.—A. KVETENSKY.—This plant, with a present output of 30,000 hp., contains a number of unusual features. Local conditions made it necessary to install the three-story power house in a shaft 22 m. deep, blasted out of the solid rock. A head of 188 m. is utilized in two 15,000-hp., 600-r.p.m. vertical-shaft Francis spiral turbines, tested for 87 per cent overspeed. Space and necessary foundations are provided for a third unit of the same size. The thrust bearings of the turbines operate without oil under pressure. To stop the turbines quickly after shutdown, a reverse-running Pelton wheel is fastened to the vertical turbine shaft below the thrust bearing. The direct-connected generators deliver 12,000-kva., three-phase current at 5,500 volts and 50 cycles. A 65-kw. exciter is keyed to the end of the shaft. Each generator feeds a 12,000-kva., three-phase transformer to step the voltage up to 110,000, carried on two steel-aluminum trunk lines to the city of Linz. It is of interest to note that the layout of this transmission line, which goes through difficult country, was mapped from a set of airplane photographs taken for this particular purpose. Steel towers, spaced 200 m. apart, coated by the zinc-spray method, support the line.—*Elektrotechnik und Maschinenbau*, May 14 and 21, 1922.

New Hydro-Electric Plant in Province of New Brunswick.—A well-illustrated description of this plant, just completed on the Musquash River near St. John, with particular reference to the intake and storage dam, pipe line, hydraulic and electrical equipment, transmission line and switching station. The plant contains three 2,900-kva., three-phase, 13,200-volt generators.—*Electrical News*, June 1, 1922.

Generation, Control and Switching

Rapid Automatic Circuit Breaker.—J. CANDIE.—To prevent commutator flashovers on rotary converters a French concern has developed a new, quick-opening automatic breaker, which is described in this paper, together with a number of oscillographic records showing its performance. According to the setting and the amount of energy ruptured, the breaker will open in about 0.07 second to 0.02 second. Tests with this breaker, made on a 75-kw. and later on a 250-kw., 600-volt rotary, showed that its action was quick enough to prevent any brush fire during short circuits with currents as high as 8,000 amp. A very minute description of the arrangements of the different tests is given. The author claims that such a breaker will give better protection of a rotary than the so-called anti-flash boards between brush holders.—*Revue Générale de l'Electricité*, May 20, 1922.

Recent Developments in Power Production.—D. L. SELBY BIGGE.—A summary of the advances that have been made in the economics of power production during the past eleven years is given. The need for remodeling steam generating plants is pointed out, the tendencies in steam-plant methods are noted, and the advances that have been made in turbine and condenser design are detailed. A typical colliery power station is described. The author thinks much remains to be done before the bed rock of economy in power production is reached.—*Electrician*, June 16, 1922.

Transmission, Substations and Distribution

Mechanical Design of Overhead Lines.—A. JOITEL.—Based upon the requirements of the French safety rules, the author develops a new line of formulas for the safest and simplest layout of overhead transmission lines. Of particular interest are the new alignment charts, which give a sufficiently accurate result by purely mechanical means. Each of the six charts in the article is explained by an actual example. The line constants for both copper and aluminum conductors may be obtained from the charts.—*Revue Générale de l'Electricité*, July 1 and 8, 1922.

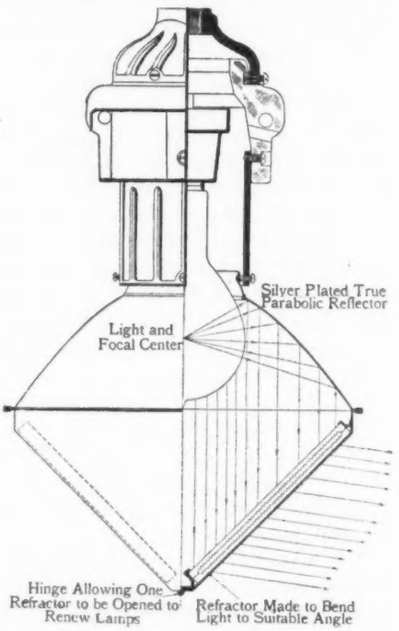
Units, Measurements and Instruments

Short-Circuit-Proof Current Transformers.—W. SKIRL.—The paper describes the latest types of "bar transformers" for currents of 300 amp. and up, suitable in secondary energy supply to operate a wattmeter, a relay and a meter. For currents between 10 amp. and 300 amp. a similar type, but with a loop as primary, is described. This latter type, however, is only overload-proof. A small spark gap built into the smaller transformers gives protection against sudden overvoltages. The long insulating tubes in which these instrument transformers are placed make the construction very suitable for a wall or a ceiling entrance bushing, which is of great advantage for indoor switching stations of several stories. Some of the single-bar transformers designed for 300 amp. have withstood satisfactorily a dead short circuit from a 60,000-kva. generator in which a crest value of 114,000 amp. was reached before the breaker opened.—*Siemens Zeitschrift*, May and June, 1922.

Temperature Measurement of Electric Machines.—A. TAUBER.—A resistance thermometer is described using an alternating-current operated bridge method with a two-winding indicating instrument. The author gives a mathematical analysis of the method, with diagrams and photographs of the apparatus used. The measuring resistance itself can be confined to a surface as small as 4 sq.in., a feature of importance in the exploration of so-called hot-spots in electric machines.—*Bulletin Schweizer Elektrotechnischer Verein*, June, 1922.

Illumination

Highway Lighting.—H. H. ASHINGER.—The proper lighting of highways is accomplished by fulfilling at least two equally important conditions—(1) providing a clear view of the whole roadway for a considerable distance ahead of the car, and (2) elimination of glaring lights within the range of vision of the driver. The lighting unit shown in the accompanying illustration meets these exacting requirements. This consists of a porcelain housing


Silver Plated True Parabolic Reflector
Light and Focal Center
Hinge Allowing One Refractor to be Opened to Renew Lamps
Refractor Made to Bend Light to Suitable Angle

GLARING LIGHT ON HIGHWAYS PREVENTED BY THIS UNIT

which contains the series socket for a type C "Mazda" lamp, a reflector and a double set of refracting prisms. The reflector is made of porcelain-enameled steel, reflective white inside with bottle-green enamel on the outside. Its shape is parabolic and so arranged with relation to the refractor prisms that all light is thrown on a long stretch of road.—*Electrical Journal*, May, 1922.

Effect of Color of Walls and Ceilings on Resultant Illumination.—A. L. POWELL.—No matter how carefully designed a lighting system may be as to type and size of lamps, type and make of reflector, spacing height, etc., if the surroundings are not adapted to reflecting such light as strikes them, then

an inefficient system may result. The ceiling and wall surfaces in a room are secondary sources of light, and merely increasing the reflection coefficient of the ceiling a slight amount may greatly increase the effective illumination. It is important that the ceilings be as light in color as possible. The actual finish must also be considered as a glossy surface introduces glare and a flat or matte finish is essential. Gloss enamel produces a glaring surface while flat enamel overcomes this objection and is easy to clean. The paint must be composed of chemically inert substances ground exceedingly fine to produce density and mixed with an inert vehicle which is impervious and non-porous when dry.—*Bulletin L. D. 102A, Edison Lamp Works.*

Motors and Control

Diagrams for Coil Winders.—A. C. ROE.—A card system for keeping complete motor repair data is explained, based on the records of a large repair shop over a two-year period. Among the coils for which winding data are given are mush, threaded-in diamond puller, insulated puller, mold-wound and strap-copper coils. Tables give the cross-sectional area of bare copper straps and bars, diameter and area of round and square copper wire with various insulations and dimensions, and cross-sectional area of bare and double-cotton-covered ribbon wire.—*Electrical Review and Industrial Engineer*, June, 1922.

Rotary Converter Adjustable-Speed Sets.—L. H. HOOK and F. R. BURT.—A description of how two rolling-mill machines, an 8-in. five-stand mill and a 14-in. seven-stand mill, were changed from steam to electric drive. In the 8-in. mill a constant-speed 292-r.p.m., 500-hp. motor was installed, directly connected to the mill through a flexible coupling. An interesting feature of this installation is that since the mill was electrified the tonnage has been almost doubled on certain schedules. In the case of the 14-in. mill, where variable speed was desired, two steam engines were replaced by two duplicate 1,000-hp. rotary-converter adjustable-speed sets of the constant-horsepower type. Some operating figures are included comparing the steam and electric drive. The over-all increase in tonnage has been estimated at 10 per cent, which is considered a conservative figure.—*Paper read before the Association of Iron and Steel Electrical Engineers at Chicago.*

Heat Applications and Material Handling

Carolizing and Calite.—G. H. HOWE and G. R. BROPHY.—Some time ago T. Van Aller discovered the process of calorizing to prevent oxidation of materials at high temperatures. An alloy, called calite, has been developed by this process to make cast parts which will not corrode or oxidize.—*General Electric Review*, May, 1922.

Industrial Electric Heating for Factories.—WIRT S. SCOTT.—In the opinion of the author the rate of development of industrial load depends upon three things—the thoroughness with which the specifications are made, the selection of proper equipment, and successful apparatus. The first part of the article is taken up with a short history of this development. This is followed by a number of applications, composed partly of installations in operation and installations pending, which are examples of good application of electric heating. These installations are: Baking and drying of enamel, paint, varnishes, etc.; bread, pie and pastry baking; glass annealing; vitreous enameling; melting pots of various descriptions; china decorative work, clay and mineral products; hardening, tempering and annealing steel; application to chemical industries and annealing of copper, brass and aluminum. The article is followed by a table showing examples of furnace applications, giving the work, type of furnace used, etc.—*Electric Journal*, May, 1922.

Electrophysics, Electrochemistry and Batteries

The Nature of Speech and Its Interpretation.—HARVEY FLETCHER.—Owing to recent developments in the electrical transmission of speech it is possible to produce speech sounds at varying degrees of loudness and with definitely known amounts of distortion by electrical means. A method has been developed for measuring quantitatively the ability of the ear to interpret the transmitted speech sounds under different conditions of distortion and loudness. It was found that the intensity of undistorted speech which is received by the ear can be varied from one hundred times greater to one-millionth less than the initial speech intensity without noticeably affecting its interpretation. Apparatus designed to reproduce speech and preserve all of its characteristic qualities must transmit frequencies from 100 to above 5,000 cycles with approximately the same efficiency.—*Journal of the Franklin Institute*, June, 1922.

Traction

Present Status of the Electrification of the Austrian State Railways.—PAUL DITTES.—A special issue of this paper has been devoted to an elaborate report of the execution of the electrification program of the Austrian State Railways. The article comprises thirty-four pages, with fifty-seven illustrations, and describes the progress made in erecting and augmenting the main power stations on the Spullersee, the Ruetz and the Mallnitz. A noteworthy construction is the 8,000-hp. twin-runner Pelton wheels for the Ruetz plant, designed for a head of 160 m. (525 ft.), 3,000 l. (800 gal.) of water per second, and 333 r.p.m. At present forty-seven locomotives of three different types have been ordered for the Western lines.—*Elektrotechnik und Maschinenbau (special issue)*, June, 1922.

Control Equipments for Pacific Electric Railway.—W. M. HUTCHISON.—This company has recently added twenty motor cars and trailers to its system which are arranged for operation at both 600 volts and 1,200 volts direct current. Some of the outstanding features discussed are the employment of rugged reliable line switches specially designed for heavy use, the arrangement of main-circuit apparatus to insure proper overload protection, the use of separate unit switches to establish normal and short field connections, overvoltage protective devices, and the electro-pneumatic switch system.—*Electric Railway Journal*, June 24, 1922.

Telegraphy, Telephony, Radio and Signals

High-Frequency Resistance of Inductance Coils.—GREGORY BREIT.—On account of the importance of inductance coils in radio communication, careful studies, both theoretical and experimental, have been made on capacity effects and other effects in these coils at radio frequencies. A formula for the resistance of this type of coil is derived which takes into consideration both the skin effect and the capacity effect for the case of a short single-layer solenoid, and the results of experiments are given which check with this formula. Other formulas for current distribution and resistance are also derived.—*Scientific Paper No. 430 of Bureau of Standards.*

Miscellaneous

Peculiar Fatal Accident.—S. JELLINEK.—A scrubwoman standing with bare feet on a wet floor touched the glass of an electric lamp bulb and was killed. Medical examination proved that death was due to electrocution. A very thorough investigation showed that the installation was in every respect perfect. Upon close examination of the lamp bulb it was found that there was a small streak of lime, extending from the brass of the lamp base along the glass for about 2 in. This path was sufficiently conductive to pass enough current to kill a person. The electrical examiner made very thorough experiments to duplicate this peculiar condition in the laboratory and came to some surprising results. By means of a fine brush dipped into a variety of liquids small streaks were painted upon the glass of an incandescent lamp, beginning at the brass of the lamp base, ending at the tip of the lamp, and with a voltmeter measurements were made at 220 volts to determine the conductivity of these streaks. Potential curves were then plotted for the whole distance from tip to base. These curves are included in the original article. The investigator found that the danger from the streaks decreased considerably as the streaks dried out, but that high humidity in a room will restore most of the danger.—*Elektrotechnische Zeitschrift*, June 15, 1922.

News of the Industry

Chronicle of Important Events and General Activities, Announcements and Reports of Association Meetings, Court Decisions and Commission Rulings and News of Electrical Men

Permit Does Not Govern

Attorney-General Holds that Federal Power Commission May Refuse License to Permittee

A FORMAL opinion just rendered by the Attorney-General of the United States at the request of the Federal Power Commission (see *Electrical World* for July 29, page 239) has virtually denuded the preliminary water-power permit of its value. In his opinion Attorney-General Daugherty holds that conditions can be inserted in the license which were not indicated in the preliminary permit and that a license may be refused even if the permittee has complied with all the provisions laid down in the preliminary permit.

Since large expenditures frequently are necessary to make the preliminary investigations, it is believed that this interpretation of the law will discourage expenditures for that purpose and put a further obstacle in the path of water-power development. It is very generally believed that this was not the intent of the law, and steps will be taken at once, it is believed, to secure an amendment to the act which will make the preliminary permit sufficiently binding to justify applicants in incurring the expense necessary for the preliminary investigation. The opinion is of particular importance at this time in that it relieves the Federal Power Commission from any obligation to issue a license on the Giraud application covering a power site at Diamond Creek on the Colorado River.

DISCRETION VESTED IN COMMISSION

An extract from the opinion is as follows:

"The determination as to what conditions the license shall contain involves to a very high degree the exercise of judgment and discretion, and I find nothing in the law to indicate that the commission will or can exhaust its judgment and discretion in settling the terms of the preliminary and temporary instrument.

"If it has happened that the commission, in formulating any particular preliminary permit, has in fact set forth so fully and completely the terms and conditions to be embodied in the license as to make it seem unfair or unconscionable, after the permittee has expended time and money in formulating plans on the basis of those conditions, to add new and more burdensome ones, the situation presented will be one which the commission will meet, of course, in a just and equitable manner. With that, however, I have nothing to do."

STATE OFFICIALS TO DISCUSS LAW

A conference of attorneys-general from various states to discuss the constitutionality of the federal water-power law, which New York State has attacked in the United States Supreme Court, will take place in New York City on Sept. 21, according to an announcement by Attorney-General Newton of New York.

The conference was called by him with the view of enlisting the co-operation of every state with water power resources, developed or potential, in the pending suit to test the federal act.

Hydro Commission Plans Huge Niagara Station

Sir Adam Beck, chairman of the Hydro-Electric Power Commission of Ontario, has plans for another great hydro-electric development at Niagara Falls. Speaking at Galt, Ontario, recently, Sir Adam said: "We are quite ready to finance a new 80-ft. canal from above Niagara Falls to Queenston. That would be much larger than the Chippawa Canal. It would make available 1,000,000 hp. for the people of Ontario. We have most of the necessary property bought. The next canal will cost $100,000,000. Do not let that frighten you. We have $235,000,000 liability now and we have no defaults, but there is always propaganda against us and always misrepresentation. Hydro has never cost the taxpayers of the province one cent."

Rumored Competition in Serving Indianapolis

Investigation of the circumstances that led the Terre Haute, Indianapolis & Eastern Traction Company to apply to the Indiana Public Service Commission for a certificate of convenience and necessity to operate its electrical service lines in Indianapolis has been started by the corporation counsel of that city. Objection has been made to the plan by the Indianapolis Light & Heat Company and the Merchants' Heat & Light Company, the two power utilities which now operate electric service plants in Indianapolis. The Public Service Commission will hear the petition some time this month. John W. McCardle, chairman of the commission, said that it was his impression that the railway company did not seek to supply energy in Indianapolis.

Coal Crisis Nearing Solution

Satisfactory Outcome Expected from Cleveland Conference—President at Work on Railway Strike

ALTHOUGH no definite result of the conference between operators and labor leaders at Cleveland had been made public before the *Electrical World* went to press, there are those who look with confidence for a settlement of the coal strike very soon. The conference adjourned on Wednesday for twenty-four hours in the hope that the operators of Indiana and Illinois would see their way to join it. So great is the demand for coal and so short is the supply that prices have risen to a point where the operators would be willing to sign any reasonable wage agreement, provided it would terminate in a year.

A settlement of the coal strike at this time, while it would insure full mine production, would not remove entirely the tension caused by the coal shortage. Rationing would be necessary for months to avoid hardships. Many electric public utilities are dangerously near a shutdown owing to lack of fuel, particularly in the coal-mining states. The federal government has shown no disposition to aid the utilities in such states, but on the contrary has put the problem of fuel supply squarely up to the state governments. Nevertheless, the various public utility associations have opened headquarters at Washington so as to be of service in obtaining and shipping coal.

Until a settlement is reached in the railroad strike little headway can be made. There are indications, however, that the President will be able to effect some settlement before Congress meets again. If these plans miscarry, drastic steps may be taken, in which case it is confidently asserted that the public will back the President to the limit.

Utilities Appoint Fuel Representative at the Capital

Realizing that the strikes of coal miners and railway men have produced a very serious shortage in coal for public utilities, the Joint Fuel Committee, which represents the National Electric Light Association, the American Gas Association and the American Electric Railway Association, and of which John W. Lieb, New York, is chairman, has arranged for executive representation of the public utility industry at Washington. Col. John Price Jackson of Philadelphia will be the executive operating under the Joint Fuel Committee

at the capital. His headquarters will be at 949 Munsey Building.

Colonel Jackson was formerly dean of engineering and professor of electrical engineering at the Pennsylvania State College, state commissioner in charge of the Pennsylvania Department of Labor and Industry, chairman of the Pennsylvania Industrial Board, and during the war chief of the Labor Bureau and deputy director of the Army Service Corps. He is well informed on conditions in Washington. Until retained for the work he has just undertaken he was manager of the industrial relations committee of the Philadelphia Chamber of Commerce.

Colonel Jackson took charge at Washington on Tuesday, Aug. 8, and in a letter from New York headquarters all member companies were invited to communicate with him direct, by letter or wire, on all matters arising out of the present emergency. He will have a competent staff to assist him and will be supported by the Joint Fuel Committee and the headquarters staffs of the three public utility associations.

NEW YORK STATE UTILITIES FORM FUEL COMMITTEE

Executives of utility companies from all parts of New York State met at the offices of the Public Service Commission on Aug. 5 and established the Utilities Fuel Committee, which will work with the Governor's Fuel Commission. John W. Lieb was made chairman, and C. H. B. Chapin secretary.

It will be the function of this committee to keep account of the fuel needs of all electric railway, gas, electric, water and steam utilities, private and municipal; to ascertain their stocks on hand and the supply ordered, and to see that coal is obtained by those companies which must have it if it is possible to obtain. All applications from New York State utilities for coal or for priority shipments in future must be approved by this commission before action on them is taken by the state body.

A. I. E. E. Meets at Vancouver

More than Two Hundred Delegates Assemble in British Columbia City—President McClellan Discusses Present-Day Problems and Eulogizes Pioneers

THE Pacific Coast convention of the American Institute of Electrical Engineers, held at Vancouver, British Columbia, this week, was entirely successful. On Wednesday evening the registration had reached 213. Retiring President McClellan presided over the convention, which was conducted as a part of his administrative year. In his opening speech, following Lieutenant-Governor Nichols' address of welcome, Mr. McClellan, taking his cue from the fact of meeting on Canadian soil, laid emphasis on the extended significance of the word "American," which is now recognized as applying not only to the United States but also to the great English-speaking sister democracy on the North American continent.

O. B. Coldwell, vice-president of the A. I. E. E. for the Northwest, spoke of the unlimited opportunity and obligation of the electrical engineer in that region, which is "short on population and long on natural resources." With the opportunity for the use of electricity on the farm and in the home, the electrical engineer in the Northwest has more to do than anywhere else in the country.

One of the important features of the convention was the dinner Wednesday evening, at which President McClellan made the principal address. Paying tribute to the spirit of the pioneer who broke trails to the Northwest and to the pioneer engineer who made transportation and communication possible to the same region, he pointed out that there is no longer any frontier and that present problems are more or less permanent. The problems today are concerned with internal organization, which has replaced external force, and this will largely be industrial organization. He dwelt on the need to conserve human resources in contradistinction to the past waste of natural resources, declaring that there must be organization for production and for the enjoyment of life on the American standard, that this entails multiplication of mechanical production, and that the distribution of goods must be based upon a transportation system of highest economy. All of this means that there must be power everywhere on tap, that the farm will depend upon electricity, that industry will be entirely electrified, and that there will be extensive electrification of railroads. He said that the nation is just entering an era of power. The electrical engineer of the West, with his high-voltage transmission, brings hydro-electric power to the back door, and the electrical engineer of the East develops super-steam stations with increasing economy.

Mr. McClellan asked what part the engineer will have in this development in its larger aspects. He will always have his technical part, of course, but in addition, the speaker asserted, he must rise, with full right to be there, to the plane of the lawyer and the economist in solving broader problems. He must, that is, develop the professional spirit as well as technical ability.

The convention adopted a suitable resolution on the death of Alexander Graham Bell. It paid a tribute also to Honorary Secretary Ralph W. Pope, who did pioneer electrical work in British Columbia many years ago. The local members provided entertainment, including scenic and inspection trips.

Abstracts of technical papers and discussions will be given in an early issue.

Coal Supply in Middle West

Commonwealth Edison Saves Fuel Through Rail Strike—Shortage in Some States

THE loss of the elevated and street railway load by the Commonwealth Edison Company, Chicago, during the recent six-day strike resulted in a saving of 1,900 tons of coal daily. Outside of this drop in railway load, E. J. Fowler, the statistician for the company, informed a representative of the *Electrical World*, the strike had little effect on the production of electrical energy. The railway load, which is supplied completely by the Commonwealth Edison Company, is about one-third of the entire load on the company's lines.

Comparing the railway load on Aug. 2 with the same day in July, it was found that there was a decrease of about 92 per cent. The 8 per cent not accounted for represented the energy used by the railway shops, the Chicago, North Shore & Milwaukee Railroad and the Chicago, Aurora & Elgin road.

Mr. Fowler verified the report that the company had a thirty-six-day supply in the bins and a ten-day supply en route. The Public Service Company of Northern Illinois, serving fifteen counties in the northeastern part of the state, has supplies for the same length of time.

REPORTS FROM OTHER STATES

The Detroit Edison Company reports about 30,000 tons of coal on hand, or a ten days' supply at a daily rate of consumption of 3,000 tons. According to President Dow, unless coal which is ordered can be moved into Detroit service will have to be partly suspended.

No request that service be discontinued because of lack of fuel will be granted Indiana utilities, according to officials of the Indiana Public Service Commission. The coal situation has, however, become so acute in that state that certain public service companies have announced they will ask permission to suspend service within a week or two unless they get coal. Many of them have refused to pay soaring prices for fuel. John McCardle, chairman of the Indiana Public Service Commission, has been appointed fuel administrator, and plans are being formulated by the Governor to insure state institutions and public service companies an adequate coal supply.

Although reports from twenty Wisconsin utilities indicate that there is a thirty-day supply of coal on hand, the fuel situation is becoming serious in that state. With the coal supplies of the Wisconsin Public Service Company at Green Bay, Sheboygan, Oshkosh and Manitowoc nearing exhaustion, the Railroad Commission placed these plants on the priority list to receive each from three to four cars of coal daily. The Wisconsin Traction, Light, Heat & Power Company, at Appleton, has also been informed by the fuel board that enough coal will be supplied to keep its plants in operation.

O. C. Merrill Attacked

Accused of Discriminating Against Interior Department, Secretary of Power Board May Be Ousted

OPPOSITION has arisen to the policy of O. C. Merrill, executive secretary of the Federal Power Commission, based on charges of discrimination against the Department of the Interior in the conduct of his work under the water-power act. Since Mr. Merrill was for many years an engineer in the service of the Department of Agriculture, it is contended in some quarters that he is unable to forget his old affiliation and is extending unduly the jurisdiction of that department over water-power matters. Others contend that the War Department is being allowed too great a voice in matters pertaining to the country's power resources. This is said to be made possible by the fact that the chief counsel, the chief engineer, the assistant chief engineer and one assistant engineer are army officers, detailed from the War Department. In addition, the chief accountant, the assistant chief accountant and one assistant engineer are paid by the War Department. The chief accountant, while paid by the War Department, was drafted from the staff of the Interstate Commerce Commission.

Those who favor a greater participation by the Interior Department in the commission's activities point out that the work is of a type with which the Geological Survey, a branch of that department, has been concerned since its inception and that the survey has organized twenty-two districts, covering the entire country, and has in the field nearly a hundred engineers trained in power investigations. For nearly a year Secretary of the Interior Fall has not participated personally in Federal Power Commission matters. In this he has been actuated principally by his belief that interdepartmental boards are mistakes where administrative duties are undertaken in that they allow a subordinate secretary to exercise the far-reaching powers usually intrusted to Cabinet officers.

How the Work Is Divided

The annual report of the commission, which covers its operations up to Nov. 1 last, shows that matters submitted to the Geological Survey for investigation, report and supervision are approximately three times as great in proportion as those submitted to either the Department of War or the Department of Agriculture. Sixty-nine of the applications filed up to that date affected navigable waters and, according to Mr. Merrill's interpretation of the act, had to be referred to the War Department. In the same manner 150 projects were referred to the Department of Agriculture for report, since they affected the national forests, while the remaining forty-one were referred to the Geological Survey, since they affected public lands where neither navigation nor forests were involved. In addition, it is pointed out that in the two intensive investigations which the commission has undertaken—those of the Columbia and the Deschutes—the federal members of the board have consisted of one from the War Department and two from the Interior Department.

The basic cause of the friction between Secretary Fall and Mr. Merrill is their diverging opinions on conservation, the former holding liberal and the latter much stricter views on this subject. It may be asserted confidently, however, that the electrical industries, which at first feared that Mr. Merrill's theories might be pushed to the point of throttling development, have come to a very general opinion that he is practical and entirely willing to be reasonable and sympathetic with the industry without losing sight of the public's interest. He has had to struggle with the difficulties due to having to run his office with borrowed personnel. His incumbency, moreover, involves a personal sacrifice in view of the much greater financial returns that private employment would bring him. For the latter reason it is entirely possible that Secretary of War Weeks and Secretary of Agriculture Wallace, both of whom are in accord with Mr. Merrill's policies, may not feel inclined to make an issue of the matter if Secretary Fall carries his opposition to the point of asking that the President remove Mr. Merrill from the secretaryship of the commission.

International Radio Congress at Chicago

The use of short waves for radio telephony was considered in a paper written by Guglielmo Marconi and presented at the international radio congress held in Chicago during the "Pageant of Progress" on Aug. 7. Since Senator Marconi was unable to attend the opening session, his paper was read by George H. Clark of the Radio Corporation of America. Explaining his experiments with short waves, the inventor declared that, apart from the difficulty caused by fading, these waves were much more efficient in directive sending than the longer waves. By using reflectors in much the same way as in searchlamps, he had found that the absorption loss was decreased and the possibility of directing his waves increased. He likened the apparatus to an eye which could be so adjusted as to be blind in all but one direction and especially keen in that one. From an energy standpoint this method of directing short waves required less power, since effort was concentrated over a few degrees of arc rather than dissipated by sending uselessly in every direction.

Dr. J. H. Dellinger, physicist of the Radio Laboratory at the Bureau of Standards, dealt with the inductive-interference problem in radio telephony.

Reorganization Plans Ready for Union Electric

The Missouri Public Service Commission on Aug. 4 issued an order permitting the Union Electric Light & Power Company of St. Louis to reorganize by forming a new company with a larger capitalization. Under the order the authorized capital stock of the new company will be $25,000,000 of preferred and 650,000 shares of common without par value. The outstanding stock of the present company is $6,000,000 of preferred and $11,015,200 of common. The initial preferred stock is to be issued share for share in exchange for the outstanding shares of the present preferred, and five shares of the new common stock are to be exchanged for each share of the present common. The remaining common shares of the new company will be sold for $20 each. The paid-in capital of the new company will therefore be $19,000,000.

The order authorizes the present company to turn over all its property, franchises, surplus, reserves and other assets to the new company. After all the processes of absorption are completed, the new company, which will be known as the Missouri Electric Light & Power Company, will dispose of its assets to a new Union Electric Light & Power Company, with identical organization, and in that way the present name will be retained.

According to an announcement by Louis H. Egan, president of the company, the purpose of the reorganization is to provide a financial structure which will permit the expansion of the company to meet the growth of its business and which will be sufficiently elastic to meet the varying requirements of investors. It is estimated that the new financial plan will permit expansion to about four times the company's present size.

Ten-Million-Dollar Station Is Planned by Detroit Edison

Preliminary engineering work for a central station on Slocum's Island to cost ultimately $10,000,000 and have a rating of 60,000 kw. has been finished, and, although no construction is likely to be undertaken this year, work on the plant may be under way before the end of 1923, according to President Alex Dow of the Detroit Edison Company. This station will on completion rank with the recently constructed Marysville plant of the Detroit company and will come to the aid of the Delray plant, which now serves the down-river district. It will supply sections of west and northwest Detroit and release much power for use in the central part of the city. It is also planned to use the new plant to serve not only the river cities but places as far south as Monroe and inland to the field now served by the Huron River plant. This plan will be aided by the use of overhead transmission lines.

Frank W. Frueauff Laid to Rest

Noted Public Utility Operator Buried in New York, Mourned by a Host of Friends—Tributes from Some of His Confreres in the Electrical Industry

ON MONDAY of this week Frank W. Frueauff, an account of whose death was published in the last issue of the *Electrical World*, was buried in Woodlawn Cemetery, New York. A host of friends and business associates attended the funeral service held in his home on Fifth Avenue. The office of Henry L. Doherty & Company, of which firm Mr. Frueauff was the junior member, was closed on that day out of respect to his memory. Among those in attendance at the funeral service was a committee of the National Electric Light Association, comprising Past-presidents John W. Lieb and W. C. L. Eglin, President Frank W. Smith and Executive Manager M. H. Aylesworth.

Mr. Frueauff's sudden and unexpected death came as a great shock to his business associates and friends. Messages of sympathy and condolence were received from all parts of the country by his widow, and some tributes from his business associates and confrères are appended here. Mr. Frueauff, when he collapsed, had under his arm proofs of photographs of himself taken a few days previously. One of these photographs is reproduced on this page.

DOHERTY'S TRIBUTE TO HIS FORMER PARTNER

Naturally the man who next to his immediate family was most shocked by Mr. Frueauff's sudden death was Henry L. Doherty. At the request of the *Electrical World*, Mr. Doherty prepared the following statement:

"Frank W. Frueauff was more than my sole partner, my closest friend and my expected successor. The relationship between us was that of younger and older brother, and I, as the older brother, not only had unqualified faith in him but a great pride as well and had always leaned heavily upon him in both business and personal matters. The thought never crossed my mind that he would be taken in advance of me.

"We have been associated for nearly a quarter of a century, and during all of that time he was a man of most careful and temperate habits. If right living and right thinking alone would insure long life, he would have lived long beyond the allotted three score years and ten.

"It has always been my theory that the man who builds up an organization should step down and out while he is still young and vigorous, and so determine by actual test whether that organization can run itself. This I have done for a long time now, devoting myself solely to matters having nothing to do with the routine operation of our business, and have found that we have an organization well qualified to run itself.

"Recently I had been urging upon Mr. Frueauff that he adopt the same policy. This he had done of late to a large extent, and he was planning a vacation in Europe at an early date.

"It would seem almost an apology for me to enumerate the qualities in Mr. Frueauff which call for the usual statement of appreciation. No words could convey such a thought to those who were familiar with both of us so well as the unfailing confidence and the unfaltering faith I have always shown in him.

"Mr. Frueauff had unusual executive ability. He was especially successful in choosing men to fill the responsible positions in the organization. He made few mistakes. Today the general managers of the properties throughout the country and the twenty-six division managers and heads of departments at headquarters in New York, most of whom he selected, will in efficiency and in ability compare favorably with any similar body of men in the nation.

FRANK W. FRUEAUFF
(From a photograph taken just before his death)

"Possessing as he did the power to win and hold not only the co-operation but also even the affectionate regard of his associates and employees, Mr. Frueauff seemingly directed the affairs of the several companies without effort. His control, however, was absolute. He knew every essential detail of the 120 or more subsidiaries of the Cities Service Company. His accurate memory of these details was a constant source of wonder among the executives.

"We shall miss Mr. Frueauff sorely, but owing to the splendid training he gave to the younger men in our organization his loss will be the heaviest from the standpoint of losing our beloved friend and companion. It is a great tribute to his business ability that he left his business affairs in such shape and had so well trained other men to take up his duties that the business will not suffer thereby."

LOSS FELT BY INDUSTRY

Mr. Frueauff was probably best known to public utility men, and these all mourn his loss.

"In the removal from public utility service in the prime of life of Frank W. Frueauff the utility companies of the country have lost one of their most prominent leaders and wisest counselors," said John W. Lieb of the New York Edison Company. "With a modest and unassuming personality, his was yet a forceful character ever ready to co-operate and advance the best interests of the industry in which he played so conspicuous a part. He did not hesitate to devote his energies to the initiation of new and progressive policies, popularizing the business and aiming at the establishment of closer relations between the utilities and the communities which they served. He will be greatly missed from the devoted circle of his friends as well as from the wide sphere of his business associates."

Gen. Guy E. Tripp, chairman of the board of directors of the Westinghouse Electric & Manufacturing Company, said:

"The death of Frank W. Frueauff was untimely. The future held great promise for him. His splendid qualities as a man and high order of natural ability would have carried him far. His intimate friends had long recognized these qualities and he had already achieved great business success; but, if he had lived, I think the next few years would have placed him as an outstanding figure in American affairs. In my frequent contacts with him I found his clear-sightedness and absolutely honest methods of thinking refreshing interludes to ordinary business experiences.

"His attitude of mind toward his duty as an official of public utility corporations always demonstrated a full recognition of the proper relationship of public utilities and the public, and his influence in the electric light and power field always promoted an enlightened conception of public rights.

"The industry has suffered a great loss. His friends genuinely grieve for the loss of a superior man. His untimely death was most deplorable."

MR. MITCHELL'S TRIBUTE

Among the men who came into intimate contact with Mr. Frueauff in a business way is Sydney Z. Mitchell of the Electric Bond & Share Company. The Doherty and the Bond & Share organizations have properties in the same states, and some of these are interconnected. Speaking of Mr. Frueauff, Mr. Mitchell said: "Frueauff belonged to the progressive school in the electric light and power industry. He was a great believer in organization and economic combination and had a keen perception of the value of public relations.

"As the operating head of the Doherty organization Mr. Frueauff was confronted with a great variety of problems, because the Doherty holdings embrace large oil and gas properties as well as electric light and railway companies. To operate any one group alone is a man-size job, so one can well imagine the great strain that Frueauff was constantly under. He never showed it, however, and outwardly was always calm and affable. He was a tower of strength to Mr. Doherty and to the organization he directed. It is a great public loss that Mr. Frueauff should be taken away in the prime of life. He made his mark in the world, however, and all who were privileged to know him feel his loss keenly."

TRIBUTES FROM OTHERS PROMINENT IN THE INDUSTRY

W. C. L. Eglin, vice-president of the Philadelphia Electric Company, who preceded Mr. Frueauff as president of the National Electric Light Association, was greatly impressed by the spirit with which Mr. Frueauff, who during Mr. Eglin's presidency was the ranking vice-president, engaged in association work. "He stuck to me like a brother," said Mr. Eglin. "He never neglected any assigned duty but was always anxious to help. When he was elected president he kept up the progressive work started in previous years and did it so well that, despite the fact that he came out of Denver a comparatively obscure man, when he relinquished his office he was one of the best known and most highly respected men in the industry."

To Martin J. Insull, who manages the largest syndicate in the public utility field, Mr. Frueauff's calm, mature and honest judgment has always been a source of admiration. "Frueauff," he said, "was one of the most optimistic men regarding the electrical industry that it was ever my privilege to know. Well grounded in utility work, gifted with common sense and with an uncommonly attractive personality, he exerted a wholesome influence upon all within the circle of his acquaintance. It is impossible to estimate the value of his work for the industry. That he did much is freely admitted, and the noble thing about it all is that he did it so modestly and unobtrusively. His death is indeed a great loss."

As many young men in the electric light and power business have reason to know, Mr. Frueauff was always their stanch advocate. President Frank W. Smith of the N. E. L. A. dwelt on this trait of Mr. Frueauff's. "Mr. Frueauff," he said, "on numerous occasions has been most outspoken for the young men of the industry. He always insisted that the N. E. L. A. should not neglect them. 'I know what the National Electric Light Association has done for me,' Frueauff would say, 'and I want every other young man in the business to get the same inspiration and help that I got out of it.' While we all lament his death, none, I am sure, will miss him more than the young men who are struggling to advance themselves, because Frueauff was their best friend."

M. H. Aylesworth, executive manager of the association, knew Mr. Frueauff when he was in Denver and spoke in most glowing terms of his ability as an organizer. "While his rise was rapid and unbroken," said Mr. Aylesworth, "no one who knew Mr. Frueauff could expect anything less of him. His was a personality that was bound to succeed. Mr. Frueauff grew up with the Denver Gas & Electric Light Company, and so marked became his ability that any keen observer could see that Denver was too small to hold him. He was capable of greater things. Henry L. Doherty knew it and gave him the opportunity to show his ability. Frueauff was young, enthusiastic and resourceful, and the work he accomplished will always be an inspiration to the industry. We can ill afford to lose men of the Frueauff type."

Rate Dispute at Springfield, Ohio, Terminated

After a controversy of six months over the domestic electric lighting rate in Springfield, Ohio, agreement was reached on Aug. 5 between members of the City Commission and representatives of the Springfield Light, Heat & Power Company for a reduced rate operative for two years. The rate agreed on is 8½ cents for the first 30 kw-hr., 6 cents for the next 30 kw.-hr. and 3 cents for all additional energy over 60 kw.-hr. The new rates will apply on bills from and including the September accounts.

Until last fall the rates in Springfield were 12 cents for the first 15 kw.-hr., 7 cents for the next 45 kw.-hr. and 3 cents for all additional energy. In December the company voluntarily reduced the rate to 11 cents, 7 cents and 3 cents. The efforts of the city to force a still lower rate have already been recounted in the *Electrical World*. Finding itself facing a long and costly legal battle, the City Commission began negotiations to compromise, and the new rate agreement is the final result.

Under the terms of the agreement the city obtains light for all municipal structures at a flat rate of 3 cents regardless of the amount of energy consumed.

Denver Men Want National Gathering in Colorado

Not only has the Society for Electrical Development made plans for a country-wide conference of representatives of local electrical leagues to be held at Association Island, Henderson Harbor, N. Y., in the first week of September, as recorded on page 290 of last week's *Electrical World*, but the Electrical Co-operative League of Denver is contemplating a similar meeting, also of national scope, to be held during the joint convention of the Rocky Mountain Division of the National Electric Light Association and the Colorado Electric Light, Power and Railway Association at Glenwood Springs, Col., on Sept. 11-13. A questionnaire has been sent to all electrical organizations asking their views upon the feasibility of holding such a meeting, and definite decision will be withheld until a consensus of opinion is obtained.

Americans to Join in Brazil's Engineering Congress

American engineering societies have been invited to participate in the activities of the international engineering congress to be held at Rio de Janeiro, Brazil, during the forthcoming world's fair in that city.

In order to carry out a co-operative program a committee has been formed from the membership of the A. I. E. E., A. S. M. E., A. S. C. E. and A. I. M. E. to act in this country, and another committee has been organized in Brazil from resident members. The first committee is made up as follows:

American Society of Civil Engineers: J. W. McConnell, Fred Lavis, Verne L. Havens, Milton H. Freeman and John H. Dunlap.

American Institute of Mining and Metallurgical Engineers: F. Linwood Garrison, George W. Tower and F. F. Sharpless.

American Institute of Electrical Engineers: Percy H. Thomas, Maurice Coster and F. L. Hutchinson.

American Society of Mechanical Engineers: Dwight P. Robinson, Percy H. Thomas, C. H. Crawford, Maurice Coster and Calvin W. Rice.

Percy H. Thomas is chairman of the joint committee, Ernest Hartford secretary and Verne L. Havens chairman *pro tem*. C. H. Crawford will be chairman of the Brazilian committee and will appoint other members. Verne L. Havens, editor of *Ingeniería Internacional*, will act as liaison officer between the two committees.

Calvin Rice, secretary of the A. S. M. E., plans to attend the congress in connection with an extended tour of South America. Other prominent American engineers also will attend.

San Diego Company to Issue 5 per Cent Bonds

Declining interest rates are reflected in a modified order of the California Railroad Commission permitting the San Diego Consolidated Gas & Electric Company to issue in place of $1,500,000 6 per cent bonds a like amount of 5 per cent bonds. The minimum selling price of the 5 per cent issue was fixed at 82 per cent of face and accrued interest. The company had asked to sell the bonds at not less than 80. In regard to this Commissioner H. Stanley Benedict, who wrote the decision, said: "I believe that a minimum price of 80 and accrued interest for applicant's 5 per cent bonds is too low. It occurs to me that applicant should be able to obtain at least 82 and accrued interest for its 5 per cent bonds, and this order will fix the minimum price for which the bonds may be sold at that figure."

Rural Lines to Be Debated by Michigan Association

Rural lines, tree trimming and other practical problems will form the topics of discussion at the ninth annual convention of the Michigan Electric Light Association, to be held at the Hotel Ottawa, Ottawa Beach, Mich., on Aug. 21, 22 and 23. President Smith of the National Electric Light Association will make an address, and John F. Gilchrist, vice-president of the Commonwealth Edison Company, Chicago, is to present the public relations side of utilities problems at the banquet. Ample provision for dancing, golfing and other entertainment for delegates and ladies has, as usual, been made. The tentative program follows:

MONDAY, AUG. 21

Evening.—President's address, J. K. Swanson; report of wiring and meters committee, J. C. Langdell; address, F. W. Smith, president N. E. L. A.; stereopticon address, "Radio," George Y. Allen.

TUESDAY, AUG. 22

Morning.—Report of committee on rural lines, E. Holcomb, with discussion by F. D. Avis, G. W. Brower and C. B. Calvert; address, T. A. Kenney, member executive committee N. E. L. A.; report of State Committee on Public Utility Information, Alfred Fischer, committee director, with discussion by F. A. Newton, S. B. Tuell and H. A. Fee.

Afternoon.—Golf tournament.

Evening.—Banquet; address, "Public Relations," John F. Gilchrist, vice-president Commonwealth Edison Company; "Word Sketches and Poems," Edgar A. Guest.

WEDNESDAY, AUG. 23

Morning.—"Tree Trimming," by a representative from the Public Service Company of Northern Illinois; "Aspects of State Regulation," Sherman T. Handy, Michigan Public Utilities Commission; discussion of report of wiring and meters committee, A. S. Albright, Henry Roseberry and G. E. Lewis.

Iron and Steel Men Adopt Preliminary Program

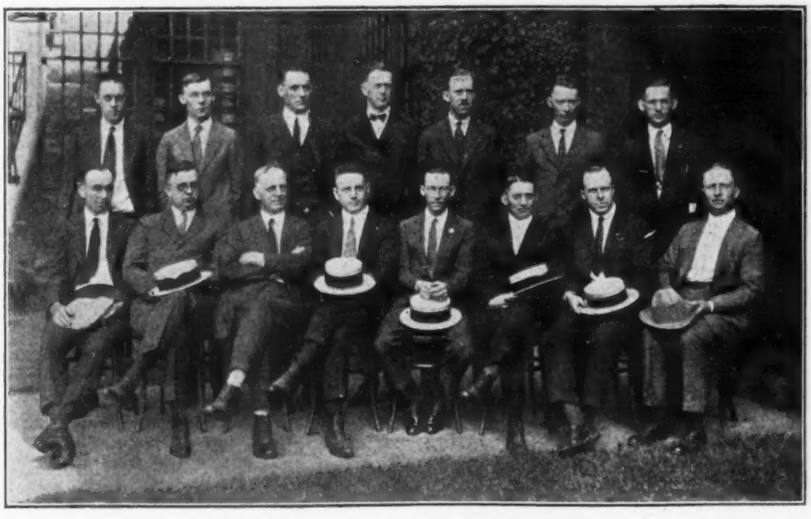
A tentative list of the subjects to be discussed at the Cleveland convention of the Association of Iron and Steel Electrical Engineers, to be held from Sept. 11 to Sept. 15, has been drawn up officially. It includes these topics: "Improvement in Efficiency of Electric Power Supply," "A Review of Steel-Mill Electrification," "Boiler Practices of 1922," "Education" and "Safety," "The Gas Engine as a Prime Mover for Power Generation," "Steam Turbines," "Judging Combustion from Gas Analysis," "Electrification of the International Nickel Company's Works for Monel Metal," "Some Considerations in the Electrification of the Steel-Plant Railroad Yard," "Power in the Iron and Steel Industry," "Control, Motor, Lighting and Crane Standardization," "Electric Furnaces," "Electrical Developments in 1922" and "Investigation of Insulators for Steel Mill Service."

College Teachers Attend the Westinghouse Conference

A crowded program covering all phases of electrical manufacturing engrossed the attention of a group of college professors who have been attending the annual summer conference at the works of the Westinghouse Electric & Manufacturing Company in East Pittsburgh, Pa.

These men were placed in the several departments of the works to obtain a first-hand knowledge of electrical equipment and design procedure, while inspection trips to steel mills, power plants and other industrial works in and around Pittsburgh were taken to make them familiar with the operating aspects of engineering. The conference, as usual, proved very popular.

The University of Pittsburgh, in accordance with its annual custom, tendered the visiting teachers a banquet and made arrangements for housing them in one of the fraternity buildings. Carl S. Coler, manager of the educational department of the Westinghouse company, has been in general charge of the conference, which ended Aug. 10.



COLLEGE PROFESSORS AT WESTINGHOUSE CONFERENCE

Top row, left to right—H. A. Haugh (Yale), R. F. Chamberlain (Cornell), W. J. Diederichs (Iowa State), C. B. Gordy (Michigan), F. N. Tompkins (Brown), F. C. Hockema (Purdue), W. O. Schubert (Clemson). Bottom row, left to right—L. A. Wilson (Oklahoma Agricultural and Mechanical), F. A. Spencer (Norwich), W. V. Dunkin (Idaho), J. H. Belknap (Oregon Agricultural), M. N. Vallas (Tulane), D. L. Markle (Pennsylvania State), L. N. Street (Syracuse), L. S. Foltz (Michigan Agricultural).

Brief News Notes

Colorado River Hearing Postponed.—Secretary Hoover has announced that the meeting of the Colorado River Commission, of which he is chairman, which was to have been held in Santa Fe, N. M., on Aug. 1, has been postponed until Aug. 28, because the coal and railroad strikes make it impossible for him to leave his post at Washington.

Portland, Me., to Have New Power Station.—The Cumberland County Power & Light Company is building a 10,000-kw. standby station at Portland, Me., which is to be completed and ready for operation about Oct. 1. The station is to burn oil fuel and to be used at periods of low water power. It is being built on the tidal flats upon 1,500 piles capped by a concrete mat 4-ft. thick. The oil tank will have a capacity of 30,000 barrels and the stack will be 225 ft. high.

Indiana Company Would Issue 5 per Cent Bonds.—The Indiana General Service Company has appealed to the Indiana Public Service Commission asking for repeal of the 7½ per cent interest provision in a recent order by the commission authorizing the company to issue $3,547,500 worth of bonds. The company told the commission that provision had been made for floating the bond issue with only 5 per cent interest and asked authorization at that rate. The company operates power companies in Marion, Muncie and other cities.

Noblesville (Ind.) Company Seeks to Expand. — The Noblesville Heat, Light & Power Company has petitioned the Indiana Public Service Commission for authority under the 1921 condemnation act to condemn eight acres northeast of Noblesville, Ind., on both sides of White River, acquiring the property from the White River Corporation. The company desires to use the property as a dam site for an electric power project. The company has been unable to obtain the land by negotiations, the petition said. The land is owned by Indianapolis water utility interests.

Turning Peat Bogs Into Electricity.—Despite its troubled political life, the Dail Eireann of Ireland finds time for the consideration of practical questions. Its committee on peat recently rendered a report in which it says that the Irish lowland and mountain peat bogs can develop power cheaply by means of gas engines and on a large scale by turbo-alternators. Nearly 4,500,000 acres of bog are available. "We are of opinion that four stations, each of about 20,000 kw. constant load, would more than suffice for Ireland's requirements of combined nitrogen for the manufacture of nitrogenous fertilizers and explosives," says the report. "We are of opinion that in the near future at least one station of 20,000 kw.

rating should be erected by the state in a suitable locality. A portion of the electric power developed can be utilized at the bog for the manufacture of calcium cyanamide and the remainder can be transmitted to the centers of industry."

Iowa Utility Assists Municipal Plant.—With its coal supply down to its last ton, the Corydon (Iowa) municipal lighting plant sent through the town officials an appeal to the Iowa Southern Utilities Company and promptly received enough coal to tide the plant over for a few days. The company also offered to furnish energy to the town if the latter would connect up with the company's high-tension line two miles away. The Iowa Southern began storing coal for a strike emergency nearly a year ago and has sufficient supplies on hand to allow operation until Oct. 1.

Summer Course in Industrial Organization.—The seventh annual summer session in industrial organization and administration will be held at the Pennsylvania State College from Aug. 28 to Sept. 9 under the immediate direction of Prof. Edward J. Kunze, assisted by Prof. J. O. Keller and P. P. Henshall of the department of industrial engineering. The course is an intensive one, designed to meet the needs of manufacturers, superintendents, personnel directors, accountants, production managers and all others who pilot the affairs of industry. Bulletins may be had from Prof. Edward J. Kunze, State College, Pa.

More Oklahoma Developments.—A controlling interest in the Southwestern Light & Power Company of Devol, Okla., has been purchased by E. C. McCain of Pawhuska and P. J. Minck of Tulsa. At present this company is purchasing electrical energy from the Wichita Falls, (Tex.) Light & Power Company. Its object is to extend service to other towns within the radius of 25 miles. The Eastern Oklahoma Light & Power Company has contracted to install distributing systems and build high-tension lines to connect with the Sand Springs Light & Power Company's line. The Sand Springs company has completed its line to Avant, Bigheart, Pershing and Pawhuska.

Electrification of Tasmania.—Tasmania, the smallest and for years the quietest of the six Australian States, has been electrified in the last six years, according to A. W. Ferrin, recently American Trade Commissioner in Australia. Isolated from the mainland by 200 miles of water and only partly developed as a pastoral, agricultural and mining community, Tasmania is extremely mountainous. In the very center of the island are six lakes at an elevation of 3,000 ft. The largest of these lakes is 21 miles long and 3 miles wide. Just before the war a company manufacturing carbide decided to utilize this lake for hydro-electric power and began the development of an ambitious plan. In 1917 the project was turned over to the state, which has since expanded it. It is announced that within a short time 50,000 hp. will be obtained and not many months thereafter 100,000 hp. Numerous industrial enterprises are preparing to use this power.

Celebrate End of Year's Work at Mitchell Dam.—The closing day of the first year's work on Mitchell Dam, on the Coosa River at Duncan's Riffle, was celebrated recently by officers of the Alabama Power Company, which owns the property, by a tour of inspection. The pouring of concrete has been going forward at a rapid rate for the past three months, and there is a section of masonry on either side of the river several hundred feet long and nearly 100 ft. high. Good progress is also being made on the power-house construction, about half way of the river and just above the dam. Power-house machinery is being received daily and stored in the warehouses along the river. If the construction proceeds according to schedule, the dam will be completed within the next ten or eleven months.

Employment Service of the Four National Engineering Societies. — An employment service for engineers of every variety of training and experience is conducted by the four national engineering societies of the United States. This service, a recent announcement says, brings in touch with the business men the 50,000 trained technical men who are members of these societies, and one of its objects is to show to commercial houses the aid which engineers are rendering to others in the same lines and to help these firms and corporations to obtain similar assistance. This service is in a position to supply chemical engineers, civil engineers, mechanical engineers, electrical engineers, sales engineers, production managers, superintendents and other trained executives. It is under the direction of W. V. Brown, with an office in the United Engineering Societies Building, 29 West Thirty-ninth Street, New York City, and is free to employer and employee.

Radio Guidance for Post Office Airplanes.—The Post Office Department has been experimenting successfully with radio-telephonic apparatus designed to make possible communication with night-flying airplanes carrying mail and thus to guide them along their route, and as a result of the experiments it is probable that a night air-mail service will be established. Radio will also be used to report ground conditions at the stations to planes in flight. If a heavy fog settles over San Francisco, the flyer with mail will be warned to land elsewhere. The passenger and mail planes between England and France are equipped with radio sets for such emergencies. Further experiments which will now be conducted by the Air Mail Service look toward simplifying the radio equipment in order to reduce the weight. The air-mail plane detailed at Bolling Field, Washington, now carries radio equipment weighing about 200 lb.

Associations and Societies

Ontario Association of Electrical Contractors and Dealers.—This association will convene at Toronto Nov. 13 and 14.

Executive Board of American Engineering Council to Meet.—Findings in a nation-wide survey of the three-shift day in industry will be placed before the executive board of the American Engineering Council of the Federated American Engineering Societies at a meeting to be held in Boston on Sept. 8 and 9. The question of government reorganization, involving a proposal to establish a national Department of Public Works; reforestation problems, international affiliations with engineering societies, flood control and water supply and plans for the country-wide expansion of the Federated American Engineering Societies will be discussed, in addition to reports of numerous committees which are considering questions of national interest.

Coming Meetings of Electrical and Other Technical Societies

A complete directory of electrical associations is published in the *Electrical World* in the first issue of each volume. See July 1 issue for latest list.

Michigan Electric Light Association — Ottawa Beach, Aug. 21-23. Herbert Silvester, Edison Bldg., Ann Arbor, Mich.

International Association of Municipal Electricians, New Bedford, Mass., Aug. 22-25. C. R. George, Houston, Tex.

New York Electrical League—Association Island, Sept. 5-7.

N. E. L. A. Geographic Divisions — New England, New London, Conn., Sept. 5-8; Rocky Mountain, Glenwood Springs, Col., Sept. 11-13; Southeastern, Atlanta, Sept. 12-15; Great Lakes, French Lick Springs, Ind., Sept. 28-30. M. H. Aylesworth, 29 West 39th Street, New York.

Pennsylvania Electric Association—Bedford Springs, Pa., Sept. 6-9. H. M. Stine, 212 Locust St., Harrisburg, Pa.

Colorado Electric Light, Power and Railway Association—Glenwood Springs, Col., Sept. 11-13.

Association of Iron and Steel Electrical Engineers—Cleveland, Sept. 11-15. J. F. Kelly, Empire Bldg., Pittsburgh, Pa.

American Electrochemical Society — Montreal, Sept. 21-23. A. D. Spillman, Columbia University, New York City.

Illuminating Engineering Society—Swampscott, Mass., Sept. 25-28. Samuel G. Hibben, 29 West 39th Street, New York.

American Institute of Mining and Metallurgical Engineers—San Francisco, Sept. 25-28. F. F. Sharpless, 29 West 39th Street, New York.

National Association of Railway and Utilities Commissioners — Detroit, Sept. 26. J. B. Walker, New York Transit Commission, New York.

Illinois State Electric Association—French Lick Springs, Ind., Sept. 28-30. R. V. Prather, 305 Illinois Mine Workers' Bldg., Springfield, Ill.

Indiana Electric Light Association—French Lick Springs, Ind., Sept. 28-30. Thomas Donohue, Lafayette, Ind.

American Electric Railway Association — Chicago, Oct. 2-6. J. W. Welsh, 8 West 40th Street, New York.

Empire State Gas and Electric Association —Lake Placid, Oct. 5-6. C. H. B. Chapin, Grand Central Terminal Bldg., New York.

Association of Edison Illuminating Companies — White Sulphur Springs, W. Va., Oct. 11-14. Preston S. Millar, 80th St. and East End Ave., New York.

National Association of Electrical Contractors and Dealers—Cincinnati, Oct. 9-14. F. Johnson, 15 West 37th St.

Electric Power Club—Asheville, N. C., Oct. 30. S. N. Clarkson, 506 Laclede Gas Bldg., St. Louis.

Commission Rulings

Stock Issue for Purpose of Extending Corporate Life of Company Disapproved.—An application of the Citizens' Electric Company of Battle Creek, Mich., for permission to issue stock for bond retirement was refused by the Michigan Public Utilities Commission, which held that the obvious purpose of the stock issue was to increase the voting power of the majority stockholders so that they could extend the corporate life of the company against the wishes of the minority stockholders, who wished its affairs wound up at the approaching expiration of its charter.

Consolidating Department of a Utility in Order to Fix Return.—In valuation proceedings for the Tucson Gas, Electric Light & Power Company the Arizona Corporation Commission decreed that the gas and electric departments of the utility might be consolidated for the purpose of fixing return since it appeared that there was no way to make the gas department earn its full return—"a plan," said the commission, "which, however much it may be at variance from numerous rate-making theories, seems to be the only alternative to permitting the utility to discontinue the unprofitable branch of its business."

Depreciation Must Be Distributed Over Life of Property.—The New York Public Service Commission in deducting accrued depreciation from the valuation of a natural-gas department of a utility (Elmira Water, Light & Railway Company), although it was asserted that past earnings had not been sufficient to provide for it as it accrued, said: "The cost of depreciation or liability of renewal should be distributed over the life of the property. Any other method is unfair alike to the investors and the consumers. The company has the right to demand that the rate or price at which the commodity is sold shall be sufficient to reimburse it for the cost of this part of its capital consumed in service, and the consumer has the right to demand that this cost be fairly distributed."

Discriminating Rates in Tennessee.—The Tennessee Railroad and Public Utilities Commission has issued an order establishing rates for the Tennessee Power Company and requiring the cancellation of all special contracts with consumers. The commission said: "These contracts were made at different times and run for different periods. The rate to be charged each customer for the service rendered is set out in his respective contract. These rates differ widely from each other and seem to have been fixed without reference to any definite rule or system. . . . After duly considering all evidence in the case, the commission is of the opinion that the rates as fixed in said contracts are unjust and insufficient; that the rates as fixed in said contracts are unjustly discriminatory, both as between the particular contract customers themselves and as against non-contract customers, and that the general public welfare requires that all said contract rates be abrogated."

Idaho Commission Lowers Valuation.—The assessed valuation of the Grangeville Electric Light & Power Company has been reduced $125,000 to $462,833.24, by the Idaho Public Utilities Commission. In the same order the commission denied the company's application to put into effect a schedule of rates filed last summer, declaring they were too high. The commission also fixed the valuation on which the company may base its rates at $480,333.24, this amount being the $462,833.24 plus $17,500 allowed by the commission for working capital. From the evidence submitted at the hearing it was shown that the company's revenue for the year ended Dec. 31, 1921, was $87,955.93. Computing the required revenue from the various allowances made, the commission found that the company should be getting $87,023.91 annually in revenue, which will pay operating expenses, including federal income tax, allow 2½ per cent for depreciation, and give the company an 8 per cent return on its investment. For the reason that the company's annual revenue now is slightly more than required, the commission denied the company's application to put into effect a schedule of rates much higher than those now prevailing.

Rural Extensions in California.—Extensions to agricultural service in which the revenue to be derived was insufficient to justify the San Joaquin Light & Power Corporation making a free extension have been made by requiring the applicants to guarantee for a period of three years an annual gross revenue equal to one-third of the cost of the extension, the California Railroad Commission asserts, adding: "Although this was an optional rule which an applicant might select and which might prove advantageous under certain conditions, yet the extension rule proper, in which consumers advance to the company a certain portion of the cost of the extension to be refunded on the basis of a percentage of the monthly bills for service, was in only a few instances explained or offered to the consumer. As a result many consumers have not received the advantage of the more favorable rule. The San Joaquin company should give each consumer who has guaranteed a definite annual revenue or who has made an advance in order to obtain service the option of advancing an amount equal to the difference between the cost of the extension and three times the estimated annual revenue or guaranteeing in three years a total revenue equal to the cost of the extension, as provided in the present rules."

Recent Court Decisions

Confiscation and Rate of Return.—Issuing a decree for the Alton Water Company to enjoin the Illinois Commerce Commission from enforcing penalties for collecting water rates in excess of those allowed by the commission, the United States District Court for the Southern District of Illinois declared that the commission had no authority permanently to suspend a schedule of rates fixed by the company without making any findings of fact or fixing new rates. In valuation proceedings the commission must consider the fair present value of the property as a going business, and the original investment or actual cost has no bearing on the question of rates, unless such cost was incurred under conditions and prices substantially the same as those prevailing at the date of the inquiry. The enforcement of a schedule of rates which would yield only from 0.5 to 1.5 per cent on the present value of the utility's property is taking such property without due process of law (279 Fed. 869).*

Damages for Inductive Interference Denied to Telephone Company.—A suit brought by A. F. Phillippay as receiver of the Connell-Kahlotus Telephone Company against the Pacific Power & Light Company to recover the cost of metallicizing its telephone line to prevent inductive interference was on appeal decided in favor of the defendant by the Supreme Court of the State of Washington, which held that it was the duty of the telephone company "to standardize its line in a way that would prevent interference in accordance with good modern engineering practice, when to maintain a single line it must make use of something which it does not own"—that is, the earth on which it is dependent for its return circuit. "There is no claim," the Supreme Court said, "that the power line was not constructed, maintained and operated in accordance with the best standards of modern engineering practice. . . . The induction from the power line to the telephone line in no manner injured any property of the telephone company but only interfered with its use. When the power line was not energized the telephone could be used, the buzzing noise not being present. There was no way that the power line could have been constructed, operated or maintained which would prevent interference by induction. . . . It is suggested that since the telephone company was first upon the highway it has a superior right. But this position cannot be sustained. The authorities are against the rule of superior right based upon priority."

*The left-hand numbers refer to the volume and the right-hand numbers to the page of the National Reporter System.

Men of the Industry

Changes in Personnel
Accomplishments, Responsibilities, Honors, Appointments and Activities of Men
Engaged in all Branches of the Electrical Industry

New Jersey Public Service Company Engages G. M. Ogle

George M. Ogle has become connected with the Public Service Electric Company of New Jersey as power representative. Mr. Ogle goes to this new

G. M. OGLE

position after thirteen years of varied experience in public utilities and electrical construction engineering. He was born in Louisville, Ky., Feb. 23, 1891, and was graduated from Vanderbilt University in 1912 with the degree of electrical engineer. Upon graduation he became connected as assistant commercial engineer with the Edison Electric Illuminating Company of Boston, which position he filled for three years, his work consisting mainly of preparing cost reports. This work was continued as power engineer for the Brooklyn Edison Company from 1915 to 1916.

Mr. Ogle entered the employ of the general engineering department of the Westinghouse Electric & Manufacturing Company in 1916 as general engineer and handled engineering problems dealing with the electrification of the rubber, paper, cement, chocolate and shipbuilding industries. In 1918 he was appointed chief electrical engineer of the United States Shipping Board, Northern Atlantic District. This work consisted in the laying out of all electrical power equipment pertaining to shipyards under control of the Emergency Fleet Corporation from New York Harbor to the Canadian border. Mr. Ogle has filled the position of chief electrical engineer for the Vulcan Iron Works, Inc., Jersey City, since 1920 and has resigned this position to accept the one already mentioned. He has devoted a large amount of time to research work dealing with the effects of electric current on the human body. This work has been carried on through the research department of the Westinghouse Electric & Manufacturing Company and also in connection with the use of electricity at Sing Sing Prison for electrocution purposes.

New General Secretary of Commonwealth Edison Benefit Society

Herbert A. Seymour, superintendent of employees' service, has been appointed by the council of the mutual benefit association of the Commonwealth Edison Company, Chicago, general secretary to succeed Herbert A. Fife, who after two years' service has resigned to resume his engineering duties.

Van Horn Treasurer of T. P. & L. Company

J. E. Van Horn of Dallas, Tex., has been elected treasurer of the Texas Power & Light Company, succeeding William Reiser, deceased. Mr. Van Horn entered the public utility field in 1903, when he became associated with the Southwestern Telegraph & Telephone Company, Dallas. Later he joined the Western Union Telegraph

J. E. VAN HORN

Company, and in 1912 he associated himself with the Texas Power & Light Company. He was elected assistant secretary and assistant treasurer in March, 1914. In February, 1921, he was elected secretary and assistant treasurer, succeeding as secretary C. E. Calder, who became president.

F. J. Howes Made Chief Engineer

Franklin J. Howes has recently been made chief engineer of the Rochester Gas & Electric Corporation in charge of design, construction and operation in all departments of the company. Mr. Howes entered the service of the Rochester company in 1908 as assistant to the mechanical and electrical engineer and seven years later was made head of the engineering department. He was born in Iowa in 1880 and began electrical work with the H. Mueller Manufacturing Company at Decatur, Ill. Before becoming associated with the Rochester company

F. J. HOWES

Mr. Howes had been connected with the Utah Copper Company, Bingham, Utah, and with the Scantic Mining & Milling Company, White Cross, Col.

Prof. A. J. Wurtz Resigns from Carnegie "Tech" Staff

Prof. Alexander J. Wurtz, who has been in charge of the department of electrical engineering of the Carnegie Institute of Technology since 1905, will retire from the staff next fall to devote all his time to research work in electrical engineering for the division of co-operative research of the institute. The acquisition of Professor Wurtz by the research division is of particular interest to electrical engineering companies because of his contribution to the development of electrical engineering. He is the discoverer of the five non-arcing metals and has made many notable inventions during his career.

John F. Cahill, superintendent of the Troy Electric Light Company, recently resigned to take a well-earned rest. In this position Mr. Cahill completed thirty-six years and six months' active service, and his resignation was received with general regret by the officials of the company. He will be succeeded by David B. Taylor, who has been assistant superintendent for six years and is therefore very familiar with the duties of his new position.

F. M. Kimball Manager of Motor Sales Division

Fred M. Kimball, formerly manager of the small-motor department of the General Electric Company, has been selected to direct the operation of the motor sales division of the recently organized merchandising department of the company. Mr. Kimball has under his supervision four distinct branches—relations with motor dealers, general sales service, general-purpose direct-current motors and general-purpose alternating-current motors. He was born in Vermont in 1861 and had his technical training at the Massachusetts Institute of Technology. He entered the employ of the Merchants' Electric Light Company of Boston in 1883 and later was transferred to the American Electric & Illuminating Company, where he was made constructing engineer. After engaging in the manufacture and sale of electrical supplies, Mr. Kimball joined the Edison General Electric Company, continuing with it until the formation of the General Electric Company, when he was made manager of the lighting supply and railway supply department for the New England district. In 1898 he was appointed manager of the small-motor department, which post he has filled until the present time.

F. M. KIMBALL

E. H. Rosenquest of New York has recently been appointed the representative of the Empire State Gas & Electric Association in the Chamber of Commerce of the United States. As national councilor, Mr. Rosenquest fills the role of liaison officer between the national chamber and his own organization on important questions.

Beaudry Leman, who fills the vacancy on the board of the Shawinigan Water & Power Company caused by the retirement of S. Ray Marshall of London, England, is a prominent French-Canadian engineer. He began his engineering career in the employ of the Shawinigan company twenty-two years ago and for six years devoted his time to important hydro-electric developments. He was largely instrumental in the progress of Shawinigan Falls during its early development as a model town and took a notable part in the construction of the railway connecting Three Rivers with Shawinigan Falls and Grand' Mère. He also made the preliminary surveys for construction of the Cedars Rapids Manufacturing & Power Company's plant at Cedars Rapids and was responsible for a number of hydro-electric reports for the Province of Quebec.

Claude J. Holslag Made Director of American Welding Society

Claude J. Holslag has recently been elected a director of the American Welding Society. Since the spring of 1918 Mr. Holslag has been associated with the Electric Arc Cutting & Welding Company of Newark, N. J., where he has been indefatigable in his efforts to advance the belief he has long cherished that alternating current is the ultimate solution of arc welding. His zeal has not been in vain, for he has been quite successful in convincing others of the soundness of this theory.

Mr. Holslag was born in Addison, N. Y., Dec. 12, 1885. He received his early training in the public schools of the state and in 1908 was graduated from Columbia University with the degree of electrical engineer. Before joining the Electric Arc Cutting & Welding Company Mr. Holslag spent ten years with the electrical department of the New York Central lines.

Edwin D. Wood, electrical operating engineer of the Louisville Gas & Electric Company, has been elected president of the Exchange Club of Louisville.

J. F. Gardiner, formerly investment editor of the Chicago *Journal of Commerce*, has entered the advertising and publicity department of H. M. Byllesby & Company.

John S. Rilling has been recently reappointed a member of the Pennsylvania Public Service Commission by Governor Sproul.

B. F. Bardo has been appointed superintendent of electrical transmission at the Coscob (Conn.) power plant of the New York, New Haven & Hartford Railroad.

J. B. Black, general sales manager of the Great Western Power Company of California, has recently been appointed acting general manager of the company.

A. A. Packard, superintendent of the Middletown division of the Connecticut Power Company, has been appointed manager of that division, succeeding L. A. Keen, who recently resigned.

Hylon T. Plumb of Salt Lake City, Utah, has been elected vice-president of the American Institute of Electrical Engineers for the ninth district. Mr. Plumb is Intermountain engineer of the General Electric Company at Salt Lake City. He has been with this company for the past twelve years, the first two years of which he spent at the Denver office. Prior to that he was professor of electrical engineering at Purdue University and other educational institutions. He has been very active in Institute affairs and was general chairman of the 1921 A. I. E. E. convention committee, which so successfully handled the Salt Lake City convention.

T. W. Rolph to Manage Street-Lighting Department

Thomas W. Rolph has been appointed managing engineer of the scientific street lighting department of the Holophane Glass Company, Inc., New York City, with works at Newark, Ohio. After being graduated from Cornell University with the degree of E. E., he became associated with the Holophane company as commercial engineer. From 1913 to 1920 he was employed in the metal-reflector division of the General Electric Company.

T. W. ROLPH

G. I. Nicholson, who was formerly sales manager for the Harry I. Wood Electric Company, Louisville, has organized a new sales organization at that city, to be known as the Nicholson Sales Company.

Harvey Ball, who has been connected with the Ball Electric Company of Burley, Idaho, has resigned to accept a position as manager of the Murtaugh Light & Power Company, with headquarters at Murtaugh, Idaho.

Thomas W. Peters, formerly associated with the Black & Decker Manufacturing Company of Baltimore, has been recently made general superintendent of the Potomac Public Service Company.

A. E. Morphy, secretary of the Southern California Edison Company, has resigned after fifteen years of service with the company to become secretary-treasurer of the Pacific Gasoline Company. Clifton Peters, assistant secretary, has been advanced to the position of secretary.

Manufacturing and Markets

Devoted to the Discussion of Business and Economic Problems of the Producer and Distributor, with Market Reports, Trade Activities, Foreign and Construction News

Our Business with Declining Prices

The Old Habits Which We Must Shake Off—How the Retailer Controls Our Opportunity

By Jacob A. Kahn
President Capital Electric Supply Company, Salt Lake City

BECAUSE the present generation has done its business almost entirely in an era of rising prices, deep in most men's minds is the feeling that high prices mean good business. We have been told that three times in our national history prices have multiplied two and a half times, that each of these periods followed close after a great war, and that fluctuating but consistent price declines followed—each time lasting from twenty-five to thirty years—and that we must now proceed to unlearn all our past price experience and educate ourselves to operate under declining prices for the next quarter century. But we all cling to our old mental habits. We hate to admit that prices are not the gage of business. And yet we know that if high prices did make good business, Russia today would be the most prosperous nation in the world.

It is time that we men who sell accepted the new order of things and settled down to the long pull ahead. We must buy more scientifically and sell more intensively and more intelligently. And our salesmen must be better trained and must work harder.

I recently heard of an experience of a large department store. The managers found that their drug department was not doing a satisfactory amount of business. They tried an experiment. They put a lot of trays in their showcases upon which they placed articles that would naturally go together. On one tray were a tooth brush, tooth powder, tooth paste, listerine, mouth wash, etc. On another tray were safety-razor blades, shaving cream, soap, face lotion, talcum powder, etc. They carried out the idea throughout every line. If a customer said, "I want a tooth brush," the tray containing a whole assortment of associated articles was placed on the counter. They found that the first month after this innovation was applied their drug business increased 500 per cent.

This showed conclusively that the salespeople had not been selling and suggests a lesson that dealers in other lines could well afford to adopt. If a customer comes into an electric store to buy any article, he should be sold by display and suggestion other articles that naturally associate themselves with the article asked for. It is a fundamental principle.

J. A. KAHN

It is not generally appreciated that 90 per cent of all goods sold at retail in the United States are bought by women. That being the case, we should select salespeople who will appeal to women and who know how to serve them. Their appearance, language, courtesy, chivalry and habits should be above reproach. They should become experts in their line so that the impression made will be so favorable that the customer will tell her friends how thoroughly the process of manufacture, the use, care and durability of the article was explained by "Mr. Smith of the electric store."

The man who will succeed in the next twenty years will be the one who adopts this attitude most quickly and most completely. For business is going to be what we make it. It is the merchant who has an honest policy, a well-located store, properly arranged to display his stock attractively, and kept clean and inviting by representative salespeople, rightly trained and instructed in the new order of business, who will succeed and prosper. If he can *create* business out of possibilities that exist, but that might not naturally develop if not created by him, his company can secure a profitable volume of trade. And it is the province and positive duty of every one of us to spread this sort of gospel.

The jobber and the manufacturer are at the mercy of the retailer. If he does his part of the job by making sales and not merely supplying demands our business will grow. If not, we cannot hope to expand it.

The Real Key to the Motor Market

Manufacturers Themselves Must See that Their Machines Are Properly Applied in Service

By a Motor Manufacturer

ELECTRIC motors have been so long and so extensively sold that they have come into a position in the market that is staple to a degree not yet enjoyed by the majority of electrical devices used directly by the public. As a result many motor manufacturers have come to feel that they are indeed manufacturing a staple article which can be sold with comparative freedom from responsibility as to who may ultimately own and use it. The resale of small motors locally is left largely to the dealer or contractor, who is supposedly competent and inherently inclined to advise properly his customers in the selection of their pur-

chases. In consequence a great many motors are being put to improper work, and the relying public is not being sufficiently protected.

MOST TROUBLES FROM MISUSE

Analyze the cases of trouble that are reported to every manufacturer of electric motors and what do you find? Here it is an open-type motor that has been sold to a grain elevator and become clogged with dirt. Or here is a squirrel-cage machine that has been put on pumping service where mud and water have been splashed on it. One large manufacturer told me recently that 55 per cent of the cases of trouble on his motors are caused by the armature striking the field because dirt has got into the machine, prevented proper lubrication and worn down the bearings. I believe that this is a fair statement of the general condition. And the reason is either that the wrong types of motors are being used too often, because nobody sees to it that the machine is selected for the work it is to do, or they are improperly installed so that they are not protected or are inaccessible for investigation and maintenance.

The popularity of electric motors depends upon their success in service, and their success in service depends on the manner in which they are used. Clearly, therefore, the development of further markets is tremendously affected by this matter of selecting the right motor for the job. Some one must censor the applications of motors, and I believe that it can only be done by the motor manufacturer himself, because he is not only interested in their sale but in the reputation of that particular machine in each particular class of service. He is more concerned in permanent satisfaction and the upbuilding of a good name for the motor than the dealer is.

BUYER LOOKS TO MAKER

Clearly we have all of us got to appreciate that it is an essential part of the motor manufacturer's job to follow each order through and learn the actual purpose for which it is desired and the conditions under which it is to be used. The public buys a motor because people are coming to believe that an electric motor is the most dependable and economical service of power. They rely on the manufacturer because they know little about electric motors themselves. It is therefore part of the responsibility of the manufacturer to see that each motor that is sold is going to give the perfect service that can only be assured where the machine is working under conditions for which it is adapted and designed.

Very often it takes trained and technical men to tell the user what kind of a motor will give best results, and the broader the experience the easier and surer will be the advice. But the main point is the matter of service to the relying public. It has been too long and too much neglected, and the time has come when it should be organized into every manufacturer's own system so that it will be done. Here is the real key to the motor market.

Survey of Business Conditions

Say Construction Will Stop Unless Coal Is Given

That the greater part of the construction projects now under way will be forced to shut down for lack of construction materials unless the present coal priority order is modified is the statement made by the Associated General Contractors of America in a petition of protest to the Interstate Commerce Commission. It is the opinion of the contractors that the action of the commission is so drastic as to defeat its own purpose to keep industry in operation by practically shutting down the second largest industry in the country, upon which 11,000,000 people depend for their livelihood.

The contractors are in favor of priority for coal for the first four classes established by the commission, including special purposes, government uses, public utilites, medical supplies and domestic consumption, but contend that building materials are just as important to construction as coal is to other manufacturers and should have equal place with it after the first four classes are served.

See Strong Radio Demand in Near Future

That within a very short time the demand for radio apparatus will be as strong as ever, and that the call, while it will not be so wild as it was in the fall of 1921, will be on a much more substantial basis, is the opinion expressed by a leading New York manufacturer. He says:

"The reason why I look for this return of business is that I have been in business for three years and conditions this summer are almost identical with those of the last two years. The business has always returned from the middle of August to the first of September with a rush. I cannot see why conditions should not be the same this year.

"I have noted a number of instances where prices have been materially reduced on both apparatus and parts; however, I do not look for any further reductions, but rather for a stiffening in price."

A manufacturer in Indianapolis reports to the *Electrical World* that his current radio sales are 30 per cent of what they were six months ago. "Deliveries are not any longer than normal," he says. "We made a reduction in price thirty days ago, but we may be compelled to raise the price later on. The outlook for the next six months is very good. We base this prediction on the fact that this is a seasonable business and in the fall is almost certain to pick up."

"Crystal prices have not changed, except in cases where amateur dealers thought they could control the market," says the head of a large crystal supply company in Illinois. "The outlook for a splendid business is very encouraging, and we are preparing for the rush.

"There was some business during the slack season, but about three weeks ago a large amount of inquiries commenced to pour in, and in the past two weeks we have enjoyed a very liberal trade considering present weather conditions."

Outputs of Copper Mines

At the present time the Calumet & Arizona Mining Company is producing about 3,500,000 lb. of copper monthly.

Arizona Commercial's output in July totaled 677,000 lb. of copper, compared with 823,000 lb. in June.

The smelter output of the Old Dominion Company last month amounted to 2,110,000 lb. of copper, compared with 2,047,000 lb. in June.

The North Butte Mining Company produced 800,000 lb. of copper in June, the first full month's production since the word was given to resume operations late in May.

Chicago Building Construction Steadily Advancing

Building permits for Chicago issued during the first seven months of this year, totaling 7,569, with a frontage of 233,949 ft., are valued at $127,712,000. This is more than has ever been spent for construction in any twelve months, the high mark heretofore being the 1921 record at $125,004,510. Up to Aug. 1 permits for 3,904 residences and 2,238 apartment buildings were taken out, according to a report of Building Commissioner Bostrom.

This will mean approximately 13,500 new homes, as against 4,566 built in 1921. Although the average cost per building in 1892 was about $5,000, in 1919 it jumped to $17,000 and in 1921 to $18,670.

Interest Shown in Fuel Oil Installations

Interest in fuel oil installations is being shown by utilities and industrial plants throughout the country, reports from correspondents of the *Electrical World* indicate. Although most companies state that their present soft-coal supplies are reasonably satisfactory, they are planing for the future when stocks will lower because of a sharpened demand brought on by the colder weather.

Oil companies are most active in broadening their market for this product. At the present time there is a large supply of fuel oil in the United States. It is reported that the Shipping Board alone owns 3,000,000 barrels. This is a revival of the tendency first manifested in 1919, when there was an oversupply of fuel oil following the cessation of the war. At that time New England led the way in the adoption of fuel oil for industrial use. The Providence-New Bedford industrial district contains a large number of oil-burning plants.

In New England the coal strike has sharpened interest in the fuel-oil-burning installations although the present soft-coal supply is reasonably satisfactory, it is said. None of the syndicates or important individual companies is reported as putting in a fuel-oil installation, although one small street railway in Massachusetts has made plans to do so.

In the New York district it is stated that the coal situation is not quite so acute as in other districts but that several companies have made inquiries about fuel oil. These consider oil-burning installations a progressive measure and a method of keeping on the safe side of labor troubles and coal strikes.

Failures Decline

Whereas a week ago the South was the only section of the United States to show an increase in number of business failures, this week it has the largest decrease. The East also reports a substantial decline, the West a slight reduction, and the Pacific States no change in their total, with the result that the aggregate number of defaults reported to R. G. Dun & Company this week is 347, as compared with 407 in the previous week. For the corresponding period a year ago 329 insolvencies were reported.

Brass Sheet Demand Improves

Commercial bronze sheets are reported in better demand than for several months, and jobbers are again receiving orders for brass sheets from the spinning and stamping trades.

Electrical Exports Show a Decided Increase

Exports of electrical machinery and apparatus took a decided upturn in June. The value of these exports was $6,216,514, or nearly $1,700,000 greater than for those of May. The total, however, is still under that of June, 1921. The detailed figures, which are those of the Bureau of Foreign and Domestic Commerce, follow:

Atlanta Jobbers Experiencing Credit Difficulties

Despite the fact that demand deposits and saving accounts throughout the Atlanta (Ga.) section have shown a healthy increase in July over June, an unusual amount of difficulty has been experienced by electrical jobbers in collections, especially on small accounts.

Volume of Business Increases

The volume of business for the week ended Aug. 2, was a trifle short of $8,809,000,000, marking an increase of $565,000,000, or about 7 per cent over the total of $8,244,000,000 reported for the preceding week.

Crystal Decorated Lighting Fixtures in Demand

Lighting fixtures decorated with crystals such as were in vogue in the Colonial days are attracting much interest. This style, which has been on the market for several months, has been selling steadily.

Although the call for these fixtures has so far come largely from the wealthier people because of their high price, a leading manufacturer reports that a demand for them from those of smaller financial resources is growing steadily. Amusement places and hotels are also among the users of fixtures embellished with crystals. Anticipating a revival of demand, a manufacturer recently went to Czechoslovakia, where he ordered large quantities of crystals. The fact that imports have increased considerably has induced Czechoslovakia crystal manufacturers to raise their prices from 50 to 75 per cent in the last few months.

ELECTRICAL EXPORTS FOR JUNE, 1922, COMPARED WITH CORRESPONDING PERIOD A YEAR AGO

	June, 1921 Value	June, 1922 Value
Electrical glassware, except for lighting		$7,775
Electrical porcelain		163,712
Carbons for electric lighting, electrodes and batteries	$24,211	116,421
Insulated wire and cable (iron and steel)		42,768
Other manufactures of aluminum	88,247	140,031
Copper wire (bare)	221,994	162,321
Insulated copper wire and cable	588,211	147,974
Generators:	581,992	.....
Direct-current—		
Under 500 kw.		49,006
500 kw. and over		25,059
Alternating-current—		
Under 2,000 kw.		17,070
2,000 kw. and over		4,220
Accessories and parts of generators		385,584
Self-contained lighting outfits		31,138
Batteries:	246,844	.....
Primary—dry		109,494
Primary—wet		17,974
Storage		149,808
Transforming or converting apparatus:		
Power transformers		952,494
Other transformers		60,739
Rectifiers		3,151
Condensers, double-current and motor generators, dynamotors, synchronous and other converters		346,702
Transmission and distribution apparatus:		
Switchboards and panelboards, except telephone		368,479
Switches and circuit breakers		127,779
Fuses and fuse plugs		14,620
Watt-hour and other measuring meters		58,286
Volt, watt and ampere meters and other recording, indicating and testing apparatus		84,194
Lightning arresters, choke coils, reactors and other protective devices		185,246
Motors, starters and controllers:		
Motors, under 1 hp.		64,154
Stationary motors—		
1 hp. to 200 hp.		154,598
Over 200 hp.		99,514
Railway motors		2,252
Electric locomotives	252,771	
Railway		4,856
Mining and industrial		74,483
Other motors	1,437,812	52,678
Rheostats, controllers and other starting and controlling equipment	85,568	86,103
Accessories and parts for motors		122,249
Electric appliances:		
Electric fans	45,540	93,742
Electric lamps—		
Arc	167	811
Incandescent—		
Carbon-filament	11,985	1,494
Metal-filament	246,450	80,196
Other electric lamps		9,619
Flashlights		19,702
Searchlights and projectors		5,430
Motor-driven household devices		64,561
Domestic heating and cooking devices	77,866	36,186
Industrial electric furnaces and ovens		48,094
Therapeutic apparatus, X-ray machines, galvanic and faradic batteries, etc.		41,933
Signal and communication devices:		
Radio and wireless apparatus		547,364
Telegraph apparatus		18,468
Telephone apparatus, including switchboards		420,820
Police, fire and burglar alarms		2,287
Railway signals, switches and attachments		54,735
Bells, buzzers and annunciators		5,819
Other electric apparatus:		
Spark plugs, magnetos and other ignition apparatus	106,890	102,765
Insulating material		70,413
Metal conduit, outlet and switch boxes		26,912
Sockets, outlets and receptacles		42,027
Other wiring supplies and fixtures	105,436	119,848
Other electrical apparatus not elsewhere specified	2,366,675	751,356
Total	$6,956,143	$6,216,514

British Copy Our Appliance Selling Methods

Give Much Attention to Increasing Use of Small Heating Devices—Wired-Home Exhibitions in the Same Manner as Here

ELECTRIC lighting systems in England find that each year the average size of domestic installations connected to their lines is becoming smaller, according to the statements made in a report just issued by the Commerce Department.

As a result of the changing economic conditions in Great Britain there has been apparent during the past year or two considerable alteration in the policy of British central-station systems. The load-building methods of American operating companies have been carefully studied, and many of our merchandising ideas have been adopted in England.

Much attention has been given to increasing the use of small electric heating devices, and in connection with such campaigns there have been one or more instances where "electric homes" have been opened for public inspection in the same manner as in this country.

Under existing conditions the electric lighting companies are finding it best to push small devices to the greatest extent at the present time, since this requires little capital expenditure on their part and results in a better diversity factor than does the load from electric ranges. Again, the small devices as a rule use current at a somewhat higher rate per kilowatt-hour than do cooking installations, and the return from such loads is naturally more profitable to the central-station system.

The merchandising of small appliances in England does not appear to have been developed to the efficiency attained in this country.

While in this country the electric iron and toaster have been pressed before the public to the point where they are generally accepted as staple articles of merchandise, the use of the electric flatiron in England is still frequently regarded as a highly progressive step on the part of the purchaser.

In connection with the development of heating and cooking load, British companies have to some extent developed a rental system similar to that often employed by them in connection with motor installations. Under this so-called "hire scheme," which is regarded as essential in developing the cooking load, the rental is supposed to cover all maintenance expenses as well as the overhead charges. The "hire scheme," while employed mainly in connection with the installation of electric ranges and radiators, is used by some companies ever for electric flatirons.

On the whole, the attitude of the British electric light companies toward domestic load promises a steady increase in the use of household appliances, and a growing market for American devices should result. The outlook is such that American manufacturers who are interested in the British market will probably find it profitable to send competent sales engineers over to England for a time to co-operate with their local representatives and to carry on in conjunction with central stations some of the intensive selling campaigns which have been successful in this country.

Conditions in England as regards socket devices and electric ranges are different from those in this country. In the first place, the bayonet socket is universal, and its construction is such that it will not permit the free plugging in of devices that is possible with the screw-base socket.

Good American Appliance Market in Cape Town

Valuable information in regard to present market conditions in Cape Town, South Africa, for the sale of electric heaters, electric irons and electric toasters has just been issued in *Commerce Reports* of Aug. 7. The article says in part:

"Owing to the fact that houses and office buildings in Cape Town are not equipped with central heating systems and in many cases have no heating facilities at all, there is a good demand for electric heaters. Houses and office buildings which are wired to receive electricity at power rates can be heated thus quite economically.

"The coiled-wire style of heaters are the most popular in Cape Town, although there are some of the large-bulb style sold. Most of the heaters handled are of English manufacture, and those priced at about $15 have the best sale. The American heaters exported to this country are for the most part too large and too expensive to find a ready market. Heaters that consume more than one unit of electricity are almost unsalable. Those consuming from 0.5 kw.-hr. to 0.75 kw.-hr. per hour find the best sale. One large retailer states that if American heaters could be obtained of the coiled-wire type, consuming 0.5 kw.-hr. per hour and selling for $15 or less, many could be disposed of.

"Formerly American munfacturers enjoyed almost a complete monopoly in the sale of electric flat-irons in Cape Town, but the recent reductions in prices of English irons and the re-entry of Germany into the field have almost killed the sale of American irons here. The average present retail prices of a 5-lb. iron of American, English and German manufacture are, respectively, $9.50, $8.50 and $7. Dealers state that more German irons are being sold than all the others put together and that both retailers and wholesalers make a larger profit on them. It would seem that unless manufacturers can so price their irons that a retailer may sell a 5-lb. model for $8 or less, then this market will be entirely lost to American electric irons.

"America still retains most of the electric toaster business in Cape Town, no German toasters apparently having been put on the market here, and English toasters at equal prices being considerably inferior to American makes. While the demand here is not great, it is believed that more electric toasters would be sold if their prices could be lowered from the present $9 at which the best-selling American make is priced.

"The high prices charged for spare parts for American electrical appliances are also much against their sale in this country. As an example of this, an element for an American 5-lb. iron costs the retailer here $2.75, whereas the same part for the same size of English iron costs $1.25. Other parts for American appliances are correspondingly high."

Bank Clearings Gain

The margin of increase in bank clearings over last year's figures narrowed appreciably this week, an agregate of $6,827,146,000 at twenty cities in the United States, as reported to *Dun's Review*, representing a gain of 12.1 per cent over the $6,089,329,412 of a year ago. Last week, in contrast there was an increase of 22.2 per cent. On the other hand, this week's clearings are only 3.3 per cent less than the $7,060,830,972 of this period of 1920, whereas there was a reduction last week, as compared with the total of two years ago, of 6.8 per cent.

Metal Market Situation

Demand for electrolytic copper continues strong at the price of 14 cents, delivered. Both wire and brass companies are buying in large quantities.

Foreign buying is rather small but fairly regular again. Weakness in exchanges is helping to restrain buying, together with the general outlook of political affairs, which will not change for the better unless England, France and Germany can arrive at some workable solution of the reparations problem.

NEW YORK METAL MARKET PRICES

Copper	Aug. 2, 1922	Aug. 9, 1922
London, standard spot	£ s. d. 63 2 6	£ s. d. 63 2 6
	Cents per Pound	Cents per Pound
Prime Lake	14.00–14.25	14.00–14.25
Electrolytic	14.00	14.00
Casting	13.45	13.45
Lead, Am. S. & R. price	5.75	5.75
Antimony	5.25	5.25
Nickel, ingot	36.00	36.00
Zinc, spot	6.60	6.60
Tin, Straits	32.25	32.37½
Aluminum, 98 to 99 per cent	19.10	19.10
OLD METALS		
Heavy copper and wire	10.50–11.00	10.50–11.00
Brass, heavy	5.75– 6.12½	5.75– 6.25
Brass, light	5.25– 5.37½	5.25– 5.50
Lead, heavy	4.62½–4.75	4.62½–4.75
Zinc, old scrap	2.87½–3.12½	3.00– 3.37½

The Week in Trade

Prices When Quoted Are Those Reported at the Opening of Business on Monday of This Week for Points West of the Mississippi River and on Tuesday for All Eastern Points

CONDITIONS affecting the electrical market have not changed during the week, reports from all over the United States indicate. Smaller sizes of motors are moving in a better way than for some months past. Appliance sales are in greater volume, flatirons and toasters receiving the most attention. Better grades continue to hold the fixture market. Washers and cleaners are selling better than a few months ago. Central-station companies are giving pole makers more business than usual and forging ahead to build additional lines in order to take better care of new construction.

New York

No Price Changes Reported — Lower Conduit Stocks—Plenty of Lamps — Motors Active

Demand for electrical materials continues steady. No price changes are reported. Stocks of conduit are lower and many orders are moving, despite the two price advances of last month. Outlet boxes are selling well.

Greater activity is reported for fixtures and domestic appliances. Washing machines and cleaners are in better demand than for some months past.

Lamps. — Prices are unchanged. Stocks are plentiful and demand continues only fair.

Flexible Armored Conductor. — Demand is very strong, stocks are lower and prices are slightly higher.

Motors.—Smaller sizes are moving best. Stocks ample and prices steady.

Chicago

Trade Unsettled by Car Strike — Conduit Still Scarce — Fans Move Slowly

Business along electrical lines has been somewhat disjointed this wek because of the street-railway strike. Although some jobbers maintain that the effects of this strike have been small, delays of construction and transportation uncertainties have all aided to slow up the forward advance in business.

Conduit in the smaller sizes is still hard to get and the market remains active. Wiring materials are selling steadily. All dealers have ample stocks of fans, but the call has been slow.

High-tension manufacturers have reported another brisk week of business.

Conduit.—The supply has not improved greatly since this material is absorbed by the trade as rapidly as shipments can come in. Demand is still brisk, and the ½-in. black pipe is quoted at $47 per 1,000 ft. in 5,000-ft. lots. Stocks are spotted, but most dealers report a scarcity of the smaller sizes.

Fans.—A summer season of fairly constant temperature has created a slow-moving market. Dealers have excellent stocks and state that with the present selling rate enough fans will be on hand to start next year's business.

Fixtures.—The usual summer dullness is here, but dealers report that the building activity is still producing a steady demand for a popular-priced fixture. The railway strike has given builders a chance to come down town this week and look over stocks since transportation difficulties have slowed up the rate of building. Industrial and office fixtures are also a bit sluggish.

Boston

Lamps Selling Well—Motor Sales Confined to Smaller Sizes — Washers Are Dull

Trade shows improvement in the face of nation-wide labor difficulties. Building operations hold up well throughout New England. Electrical manufacturing is gaining slowly but surely. Prices are somewhat unsteady, and in Boston jobbing circles conditions are disturbed because of the tendency of some houses to quote too close to the edge of profit under sharp competition. Wiring materials are in active demand, and the sale of small motors is better though not at all striking in comparisons. Electric utilities are well supplied with fuel in the main and are developing new business. Appliance sales are running more slowly in many establishments, but radio batteries are beginning to move faster in anticipation of fall trade.

Wire. — No. 14 rubber-covered is quoted firm at $6.25 per 1,000 ft. in 5,000-ft. lots. The volume of orders is brisk and substantial. Fair sales of weatherproof are noted, largely on account of central-station distribution jobs.

Flexible-Armored Conductor. — The demand is active for this material, the price being $43.20 per 1,000 ft. on No. 14 single-strip in 1,000-ft. lots. Stocks are still adequate.

Lamps.—An exceptionally good sale is reported for this season of the year. Street-lighting purchases are better, and the sale of lamps for domestic and mercantile requirements is good. Prices are firm.

Motors.—Sales are mainly confined to smaller sizes below 5-hp. and 10-hp. rating, with occasional inquiries for larger units. "Proposition" work is very active, but resulting orders are sluggish. Motor stocks are being rounded out wherever withdrawals have reduced lines. Inconspicuous betterment work in shops and mercantile establishments is absorbing many motors from month to month. Prices are firm.

Dry Cells.—Sales are in good volume, and recent extensions of discounts to cover smaller-sized lots have resulted in increased orders. No. 6 cells in barrel lots move at $30.22 per 100 and igniters at $31.22. Stocks are satisfactory. The seasonal demand for flashlamp batteries is good.

Storage Batteries.—Industrial-truck batteries are moving better, and radio batteries are in much more active demand than for some time. Vehicle batteries are not showing much life in the market at the moment.

Appliances.—Sales appear largely dependent on price at present. Vacuum cleaners have been moving under pressure of competitive designs and accumulated stocks. Washers are dull, but fans and toasters are showing some activity. Flatirons are doing well and occasional spurts in hollow ware are recorded, but these are not very well sustained this month. It is expected that hard selling work will yield reasonably good business in appliances as soon as the vacation season ends.

Atlanta

Lamp Market Better—Activity in Fuses Quickens—Fair Demand for Poles Reported

The movement in all lines of electrical supplies has been satisfactory during the past week, with prices holding steady. Up to date the railroad shopmen's strike has not particularly interfered with shipments, though some delay is experienced in certain lines. Building in the section continues active, July permits in Atlanta totaling 454 with a valuation of $1,280,226, and this activity is causing a healthy demand for all lines of electrical building material. Manufacturing and industrial expansion will shortly boost sales in the heavier lines of electrical equipment.

Lamps.—Movement has held up well all summer, and jobbers report an active market this week, due to dealers bringing their fall stocks up to normal. The 40-watt and 60-watt types seem to be the most popular. Shipments are satisfactory and no recent price changes are reported.

Radio Equipment.—Comparative dullness has prevailed during the summer months, but a brisker demand is expected with the advent of fall. The use of radio among the farmers becoming more general. Satisfactory stocks are on hand, though shipments are reported only fair.

Fuses.—Activity has quickened considerably in the past month, jobbers reporting good business. The plug fuse continues the best seller, though it is to be noted that the refillable type is gaining in popularity. Stocks throughout

the section are in good condition with shipments satisfactory.

Panel Boards.—As a reflection of the building activity in this section a very brisk movement is reported. The small sectional board continues the most popular, though some of the larger lighting and power panels are moving.

Poles.—A little better than fair demand is reported in this line, with the Southern cedar variety leading in popularity. Shipments are reported only fair. Representative prices, f.o.b. Atlanta, are: Western red cedar, 30-ft., 7-in. top, $8.35; 35-ft., 7-in. top, $11.55; Southern cedar, 30-ft., 7-in. top, $5.30; 35-ft., 7-in. top, $7.

Pole-Line Hardware.—Despite two price advances in the past month, a good demand is reported. Local stocks are ample with fair shipments.

St. Louis

Jobbers Report Moderate Decline in Volume of Trade—Interchange Conduit to Meet Demand

Jobbers report a moderate decline in volume of trade this week. Coal and rail difficulties are not affecting the market materially except in conduit, hardware and other ferrous items, though business with the industrials may suffer soon because of their enforced reduction of operations for lack of fuel. Because of possible shortage conduit sales have increased and stocks are very low. Stocks generally are well in line, but deliveries are becoming slower daily.

Building permits issued in St. Louis indicate decreased activity, the July figure being $1,985,947, as compared with $2,436,755 for June. The decrease is principally in permits for industrial and commercial structures, but it is known that a large amount of industrial construction is pending and will probably be under way by fall.

Conduit.—Interchange between jobbers is necessary to meet the demand, and stocks of some are entirely exhausted. Deliveries from the makers are poor owing to rail difficulties. Because of the decreased supply some users are laying in extra stocks. Representative quotations, in lots of 100 ft. or more, per 100 ft., are: ½-in. black, $5; ½-in. galvanized, 5.73; ¾-in. black, $6.36; ¾-in. galvanized, $7.16.

Pole-Line Hardware.—A general increase in prices of 5 per cent was made Aug. 1. Stocks are in average condition and demand is fairly active.

Poles.—There is a fair amount of transmission work in progress, and requirements for distribution extensions are comparatively strong. Stocks are in good condition and no difficulty is yet experienced in making satisfactory delivery. Northern white cedars, carload lots, f.o.b. St. Louis, with 7-in. tops, sell as follows per 100: 30-ft., $9.60; 35-ft., $16.10; 40-ft., $20; 45-ft., $22.85. Similarly, Western reds are priced: 30-ft., $7.20; 35-ft., $9.95; 40-ft., $12.05; 45-ft., $15.80; 50-ft., $18.40.

Cross-Arms.—Representative prices on 3½-in. x 4½-in. Washington fir arms, with standard boring, f.o.b. St. Louis, lots of 1,000 linear feet or more, are, per 100: 3-ft., $49.35; 4-ft., $65.80; 5-ft., $82.25; 6-ft., $98.71; 8-ft., $131.61; 10-ft., $164.51. Demand and stocks are firm.

Porcelain.—A price advance of about 10 per cent is reported. Stocks are conservative and sales are good. Representative prices are: Split knobs, $9.10; 2½-in. tubes, $3.65; 3-in. tubes, $4.10; two-wire or three-wire unglazed cleats, 9.10, all prices being per 1,000 pieces in barrel lots.

Salt Lake City—Denver

Demand for Fans Falls Off — Expect Good Market for Air Heaters—Waffle Irons Active

Crop conditions are favorable. Scattered cases of labor troubles due to violent interference are reported. Coal production is still far ahead of local demand, making exportation to centers of scarcity highly profitable.

Construction for July this year ran ahead of construction for July, 1921, by nearly 40 per cent. Considerable attention is being given to house wiring, with sufficient publicity and demonstration, resulting in a better demand for electric power.

The fan season is rapidly waning, a spell of cool weather having checked the volume of sales. From present indications, however, stocks carried over will not be excessive.

Air Heaters.—Response is not heavy, but jobbers believe air heaters will be amply stocked before the fall demand begins. Portable headlight heaters in several sizes and designs will be pushed.

Waffle Irons.—General interest is growing, with a resulting increase in sales. The type with patented turnover feature is especially in demand.

Portland—Seattle

Jobbers Report No Price Fluctuations—Railroad Strike Situation Not Affecting Shipments

Lumber mills are catching up on production. Production for mills, in the Northwest for the week ended July 29, was 4 per cent above normal. New business was 6 per cent below production and shipments were 4 per cent below new business. Exports from Portland for July experienced an appreciable slump due to the decrease in shipments of grain and flour. Shipments of this season's crops are arriving, and in a short time the grain movement will be in full swing. Construction work continues to be very active. Although it is not quite up to the record for June, it is, however, appreciably better than for July, 1921, the total number of permits being 17 and the valuation 52 per cent greater.

Electrical permits also show a falling off from June, 1921, but show an increase in number of about 34 per cent over July, 1921. The valuation, however, is less than for July a year ago, due probably to a larger number of smaller contracts at this time. Manufacturers report business picking up slowly.

This pick-up started about three or four months ago. Inquiries and sales are both good—in fact, a great deal better than last year at this time. More optimism is felt now than at the first of the year. With the exception of some minor fluctuations, prices generally have been steady for several months. The railroad strike situation is not affecting shipments to any great extent, as many of them are coming by water.

Jobbers report business to be about the same. While not so active as might be desired, yet it is appreciably ahead of a year ago. There have been no price fluctuations of any importance during the past week. The peak of the fan season is over.

Conduit.—Half-inch black conduit is quoted at $6.65 per 100 ft. in less than carload quantities and galvanized at $7.20 per 100 ft.; ¾-in. is $8.60 per 100 ft. for the black and $9.40 for the galvanized. Armored conductor, double-strip, No. 14, is quoted at $61.70 per 1,000 ft. in 250-ft. coils.

Conduit Boxes.—Three-inch boxes are quoted at $14.40 per 100 in quantities of 100, 4-in. boxes at $16.80 per 100 in the same quantities.

San Francisco

Conduit Prices Firm—Occasional Shortages in Lamp-Cord Sizes—Range Business Increasing

Building maintains a record pace, although some predict considerable decline before the end of the year. Retail-store business shows some improvement. Power business is excellent. Collections are slower, running about fifty-five days. The railroad strike is approaching a serious crisis, with deteriorating rolling stock.

Conduit.—Half-inch black conduit, $6 per 100 ft.; ½-in. galvanized, $6.50 per 100 ft., in any quantity. Stocks are good. The big jobs are nearly completed.

Lamp Cord.—There are occasional shortages of vital sizes. No. 18 cotton, twisted, $12 per 1,000 ft.; No. 18 single-silk light insulations, $10.50 per 1,000 ft.; No. 16 cotton, light, reinforced, $26 per 1,000 ft.

Motors.—This is proving a good year. Large office building installations have required an unusual quantity of the larger sizes. An unrestricted irrigation load and an exceedingly dry and hot summer have produced excellent sales of 5-hp. to 10-hp. sizes.

Farm Plants.—Decided improvement is evident. All makes are doing well.

Ranges.—Business is being increased by steady, conservative methods. One of the larger companies is featuring a progressive series of about sixty demonstrations, lectures and entertainments, gradually covering its territory.

Activities of the Trade

Devoted to News of the
Manufacturer, Jobber, Agent, Contractor and Dealer, Including Important Orders and Contracts for Apparatus and Equipment

Attention of Trade Called to Death of Frank Toomey

Attention of the electrical trade is called to the death of Frank Toomey, Sr., founder of Frank Toomey, Inc., manufacturer of boilers and engines in Philadelphia, who died Aug. 2 at Scranton, Pa.

Mr. Toomey was born in Liverpool, England, seventy-two years ago, of Irish-English parentage, and came to this country when a young man. He became connected with the Baxter Engine Company of Hartford, Conn., and had charge of its exhibit at the Centennial Exposition at Philadelphia in 1876, starting in the same year the business which now bears his name.

He was instrumental in disposing of several thousand of the Baxter boilers and engines in the eastern part of the United States and was one of the first to rebuild and guarantee the equipment which he sold.

The corporation will be conducted by the present officers—Frank Toomey, Jr., president; James A. Condor, vice-president, and Harry S. Curry, secretary and treasurer.

National Radio Chamber Is Organized in Washington

Radio apparatus manufacturers from all parts of the country met in Washington, July 26, and effected a temporary organization of the National Radio Chamber of Commerce. The officers elected were: President, W. H. Davis of Pennie, Davis, Marvin & Edmunds, New York; vice-president, Harold Powers, American Radio & Research Corporation, Medford Hill, Mass.; secretary, George Lewis of New York; treasurer, Cloyd Marshall, Dubilier Condenser & Radio Company, New York.

Dr. L. du Plessus Clements spoke for Secretary Hoover in urging the manufacturers to co-ordinate the various fields of wireless activity.

"We have the opportunity to become the leaders of the radio industry throughout the world," he said. "It is up to this convention to fulfill the important task of creating a National Radio Chamber of Commerce so powerful and progressive that the radio industry of this country can introduce American standard supplies throughout the world at American prices. Radio is a coming public utility, even more important than the telegraph and telephone.

"One problem which overshadows all others in importance is the change of the radio dabbler to a standard, regulated radio subscriber. It proves the necessity for increased broadcasting activities, the introduction of a low-priced short-range radio broadcaster, sold at a price within reach—its action and practical application governed by standard rules laid down by the National Radio Chamber of Commerce. In this way can radio activity be harnessed to public service."

Commander Hooper, U. S. N., stressed the importance to be gained from properly co-ordinating the manufacturing and government radio interests of the country so that in a national emergency the vast potential army of more than 1,000,000 radio operators would be at the instant service of the government.

Captain Guy Hill of the Army Signal Corps urged standardization of radio parts so that should it be necessary for military forces to utilize all radio sets in a national emergency, the smaller units for composing the receiving sets might be interchangeable.

Industrial Conference to Be Held Nov. 22 and 23

State Industrial Commissioner Henry D. Sayer has announced that the New York State Industrial Conference, held under the auspices of the New York State Department of Labor, will take place in Buffalo, Nov. 22 and 23. Sessions of the conference will be held at the Hotel Lafayette, which will also be its headquarters.

While the conference of 1922 will cover the same ground as did the former Industrial Safety Congress of New York State, the scope will be broadened to take in industrial matters of general interest as well as industrial safety.

The underlying theme of the Buffalo conference will be "Elimination of Waste in Industry," and several leading men in industry from all parts of the country and state will be present and take part in the discussion.

Westinghouse Balance Sheet Presents Strong Position

The Westinghouse balance sheet presents a strong position. It shows approximately $96,000,000 current assets, with about $9,000,000 current liabilities of all sorts, giving working capital of some $87,000,000. Working capital position has been bettered by $2,000,000 since the close of the last fiscal year on March 31. Accounts payable are less than $4,000,000.

There are, roundly, 30,000 on the pay roll, or about 8,000 less than at the peak of Westinghouse operations.

Power-plant construction is an important factor in the operations of the electrical companies this year. The ability of power and lighting companies to borrow funds for development purposes is bringing these concerns into the electrical market with some good-sized orders. For instance, Westinghouse recently closed a contract for power equipment aggregating $500,000 for one unit.

Another large shipment of Westinghouse material started from Pittsburgh for Valparaiso, Chile, on July 31. The train was of thirty-three cars, carrying 2,400,000 lb. of railway electrification apparatus, part of the seven-million-dollar contract for electrifying the Chilean State Railways.

The reorganization of the supply sales department of the Westinghouse Electric & Manufacturing Company has resulted in the transfer of the industrial heating section from the supply sales department to the industrial sales department. Wirt S. Scott, well-known industrial heating expert, is directing the activities of this unit of the Westinghouse sales organization, and associated with him are M. R. Armstrong, A. T. Ruttencutter, H. W. Lincoln, John M. Strait and C. R. Dakin.

Upholds Right of German Firm to Resume Business

The right of a German company to resume business in this country and solicit trade from its former customers after its American property had been seized and sold by the Alien Property Custodian was upheld in an opinion filed in the federal court in New York City recently by Judge Augustus N. Hand.

The case was an action in equity brought by the Koppel Industrial Car Equipment Company against the Orenstein-Koppel A. G., of Berlin, formerly known as the Orenstein-Arthur Koppel Company, in an effort to prevent the German corporation from again doing business in this country. The Koppel Industrial Car & Equipment Company was the purchaser of the good will and property of the German concern, including its plant at Koppel, Pa., near Pittsburgh. After the war the German corporation established an office at 50 Church Street, in the name of L. E. Hellmann. Eric Joseph, named as a defendant in the suit, is now in charge of the New York office. Before the war he was in charge of the entire American business.

The Alien Property Custodian made a deed to the Koppel Industrial Car & Equipment Company of the property and good will of the foreign corporation, and it is the contention of the American company that this transfer prevents the German company from now doing business in this country. Judge Hand rejected this contention.

The Maring Wire Company, Muskegon, Mich., manufacturer of magnet wires, announces the appointment of Jordan & Company, 305 Broadway, New York City, as its sales representatives in the metropolitan and New England territories.

Form G. E. Merchandise Department

G. P. Baldwin Appointed Its Manager—Will Handle Resale Business, a Field Which Has Important Problems Deserving Careful Attention

Preliminary announcement has been made of the personnel and organization of the merchandise department of the General Electric Company, which became effective Aug. 1.

The department will be directed by G. P. Baldwin, general merchandise manager, with H. C. Houck as assistant merchandise manager. Mr. Houck will also be in charge of the administrative division, headquarters of which will be at Bridgeport, Conn. This division will consist of the following: Sales promotion section, J. A. Corcoran; commercial research section, G. T. Fielding; advertising department representative, F. S. Ackley; publication bureau representative, H. H. Reeves; supply-house operation, H. F. O'Malley.

The commodities sales division will be directed by F. W. Hall as manager and J. O. Wetherbie as assistant manager. The sections will include: Wiring devices, J. C. Dallam, Bridgeport; conduit products, A. J. Young, Jr., Sprague Electric Works, New York; code wires, W. H. C. Smith, Schenectady; fans, R. J. Heaney, Pittsfield; Tungar rectifiers, R. E. Russell, Schenectady; transformer specialties, R. Troy, Pittsfield; miscellaneous, C. K. Mead, Schenectady.

F. M. Kimball will be manager of the motor sales division. Other sections include: Relations with motor dealers, C. H. Scott, Lynn; general sales service, L. E. Smith, Lynn; general-purpose direct-current motors, E. T. McDuffee, Lynn; general-purpose alternating-current motors, J. F. Johnson, Lynn; Sprague apparatus products, C. F. Scott, Sprague Electric Works, New York.

EXPLANATION OF FORMATION

The function of the merchandise department will be to handle the resale business of the company. Its formation means that the sale of products in this field, hitherto directed by several departments, will have the undivided attention of a department organized for that definite purpose. Thus its efforts will be centralized upon the problems of this branch of the electrical business, and among the desirable features of the new arrangement is that it will make for consistent sales policies covering merchandise handled by the General Electric Company and the companies affiliated with it.

This department has been organized in recognition of the importance of the resale trade field. It represents a realization that this field has problems of its own that deserve the careful study and attention of an organization created for that specific work.

Mr. Baldwin, who is at the head of the merchandise department was born in California and was graduated from Stanford University in 1896, afterward engaging in the street-railway business and becoming road engineer of one of the large Western traction road companies. He then became connected with the Stanley Electric Manufacturing Company, being one of its representatives on the Pacific Coast. He came into the service of the General Electric Company and was made manager of the Pittsburgh office about thirteen years ago. From there he was transferred to Philadelphia as district manager. During the war he was on the staff of Gen. George W. Goethals at Washington. He has made an extensive study of the problem of distribution and marketing.

PERSONAL HISTORIES GIVEN

Mr. Houck, assistant manager, is a native of Tennessee and a graduate of the University of Pennsylvania. He has been in the service of the company since 1899. In that year he entered the testing department of the company and on completing his work there joined the lighting department. In 1902 he was transferred to the Cleveland local office as a lighting apparatus salesman and was later made manager of the supply department of the Cincinnati district and eventually assistant manager of the Cincinnati district office. In 1912 he returned to Schenectady as assistant to D. C. R. Bullen, manager of the supply department, and was soon thereafter made assistant manager of the department. Since 1917 he has been in charge of all business handled through distributors.

Mr. Wetherbie, assistant manager of the commodities sales division, completed his work in the testing department of the Lynn works of the General Electric Company in 1904 and entered the production department at that plant. Two years later he was transferred to the supply department as an electric fan sales specialist. There was at that time no separate fan sales section of the supply department, and when as a result of the great expansion of the company's fan business such a section was organized. Mr. Wetherbie was chosen to head it and continued in that position until about a year ago, when he was appointed assistant to Mr. Houck.

The General Electric Company announces the erection of a second plant at Oakland, Cal., part of which will be devoted to increased facilities for the manufacture of switchboards and the remainder occupied by meter and instrument laboratories, service shops and offices. The tract where the new plant will be erected comprises 24 acres in the vicinity of East Fourteenth and Fifty-four Streets, Oakland. The project represents an investment of $200,000 and is the result of the initiative of Dr. Addison, Pacific Coast manager for the General Electric Company, and E. O. Shreve, local manager. The construction contract has been placed with the San Francisco office of the Foundation Company, and E. E. Talmadge will be the engineer in charge of the construction. He expects to have the plant completed early in December.

Dubilier Condenser Business Reported Increasing

The Dubilier Condenser & Radio Company, New York City, has issued a report stating that current earnings are running above those for May and June and that there are prospects of a still further increase.

Recent expansion of the company's business has been due partly to the extensive advertising campaign of Dubilier's invention, known as the Ducon device, for obviating the necessity of aërial installation. Production of "ducons" will shortly be at the rate of 5,000 daily. In addition the company is reported to have orders on hand for more than a million condensers and "micadons."

The company numbers among its customers the Westinghouse Electric, General Electric, DeForest and other big radio part-manufacturing concerns.

R. W. Cramer & Company, Incorporated

The firm of R. W. Cramer & Company, 136 Liberty Street, New York City, was incorporated early in July as sole United States distributor for several Swiss electrical manufacturers. Time switches, remote-control switches, precision thermometers and precision pressure regulators are among the electrical apparatus manufactured by F. Sauter, S. A., Basle; electric clock systems, chronoscopes and chronographs are made by Favarger et Cie., S. A., Neuchatel, and the products of A. Stoppani et Cie., S. A., Berne, carried by the company, are precision rheostats, stop watches and time movements. In addition there is carried a line of water-level indicators for hydroelectric installations. W. R. Cramer is in charge of the office.

Louisville Radio Dealers to Hold Exposition

Radio dealers in Louisville, Ky., will hold a radio exposition in the lobby of the Liberty Insurance Bank, it has been announced. More than a dozen dealers have signified their intention of entering the exhibit. All kinds of apparatus will be on display and in operation, and broadcast programs of the Louisville *Courier-Journal* will be received, according to the announcement. Expert electricians will be present to explain the equipment.

Local electric dealers have established "concert halls" for radio fans since the inauguration of the Louisville *Courier-Journal's* broadcasting station and have good crowds in their stores every evening, according to reports.

Foreign Trade Notes

A NEW POWER STATION FOR FINLAND.—A new electric power station and saw-mill, according to *Commerce Reports*, is to be erected in Forssa, Finland by Forssa, A/B, to be ready in the summer of 1923. Wood will be used as fuel.

PROPOSED WATER POWER DEVELOPMENT IN JAVA, EAST INDIES.—The N. V. Nitrogen Syndicate contemplates the development of the water falls of the Mamasa River, near Patewali, Celebes, according to *Commerce Reports*, for which water rights have been secured. It is estimated that from 150,000 to 200,000 hp. can be developed. The project includes electric power plants, nitrate plant and iron and zinc smelter, involving an expenditure of about 50,000,000 florins ($20,000,000).

ELECTRIFICATION OF RAILWAY IN CHILE.—Preparations are being made by the Nitrate Railways Company, Ltd., a British corporation operating the principal railway system in the Province of Tarapaca, Chile, *Commerce Reports* states, for the electrification of the Iquique-La Carpas section, a stretch of about 17 miles with heavy grades. The preliminary estimate of the cost of the work is placed at £2,000,000. The proposed work was covered by a contract made between the Nitrate Railways Company and the Chilean government in July, 1921. Although this contract has been declared void by the Chilean Congress, representatives of the railway state publicly that so far as the company is concerned the contract is in full force and effect. All contracts for material and work will be given out at the head office of the company at 10 Cannon Street, London, E. C.

PROPOSED ELECTRIFICATION OF BOMBAY RAILROADS.—Work will be started at once, according to *Commerce Reports*, on the electrification of the Bombay, India, steam railroads, all work to be completed by 1927. The cost is estimated at 40,000,000 rupees. The first step in the project will be the equipment of the Harbor branch, which is 7 miles long and connects the Victoria Terminus with the Port Trust Railroad. No equipment, it is understood, has yet been purchased for this branch. The Tata Hydro-electric Power Company will furnish all the power from existing substations. The second step will be the electrification of the main line of the Great Peninsula Railroad from Victoria Terminus to Kurla. Power will be provided by two substations of 3,500 kw. each. Bids for this section will be asked for in about six months. The third stage will be from Kurla to Thana, 14 miles, which will require an additional 3,500 kw. The final stage is from Thana to Kalyan, the extreme limit to which the steam suburban lines run, which is 34 miles from Bombay. This extension will require 2,000 kw. additional power. Meanwhile the Bombay, Baroda & Central India Railroad, a two-track line, is to electrify its suburban lines from Colaba Station to Virar, a distance of 38½ miles. No decision has been reached on the Port Trust Railroad. The government of India, it is understood, will provide the necessary funds for the proposed work. Messrs. Merz-McLellan, London, are consulting engineers.

Foreign Trade Opportunities

Following are listed opportunities to enter foreign markets. Where the item is numbered further information can be obtained from the Bureau of Foreign and Domestic Commerce, Washington, by mentioning the number:

A firm of importers in China (No. 3,041) is desirous of being placed in touch with manufacturers of machinery, electrical apparatus and supplies, mechanical supplies, etc., who are not already represented in that country.

An electrical engineer in Norway (No. 3,049) wishes to secure the representation of manufacturers for the sale of electric switches and insulators.

A government official in Palestine (No. 3,057) desires to receive technical information, such as catalogs and trade journals, on water supply, hydro-electric power and kindred public utilities.

An agency is desired by a firm in Italy (No. 3,061) for the sale of raw materials for industries, machinery, electrical apparatus, etc.

An engineering firm in Italy (No. 3,070) desires to secure an agency and purchase electrical machinery, including motors, transformers, conductors, compressors, transmission materials, metallic wire half-watt lamps, and electrical appliances in general.

The representative of a firm in South Africa (No. 3,141) is in the United States and desires to secure an agency for the sale of electrical supplies and equipment, automobile accessories, etc.

PROPOSED LIGHTING PLANT IN MEXICO.—A small electric lighting plant, according to *Commerce Reports*, is needed in the town of Puerto Vallarta, Jaliscoo, Mexico. The town has a population of about 2,000.

New Apparatus and Publications

PORTABLE INSTRUMENTS.—Bulletin No. 20 issued by the Jewell Electrical Instrument Company, Chicago, describes its patterns No. 2 and No. 8 of portable instruments.

ALTERNATING-CURRENT MOTORS.—The Mechanical Appliance Company, 228 Third Street, Milwaukee, has recently placed on the market a new line of "Watson" multispeed alternating-current motors.

ADJUSTABLE CONDENSER.—The O. C. White Company, 15 Hermon Street, Worcester, Mass., is distributing a small folder describing its type "TVC" "Vernier" condenser for wireless receiving sets.

LIGHTING UNITS.—The Holophane Glass Company, Inc., 342 Madison Avenue, New York City, has recently placed on the market a new series of its reflector-refractor type of inclosing globes.

BATTERY-CHARGING OUTFIT.—The Hobart Brothers Company, Troy, Ohio, has placed on the market a smaller size "HB" constant-potential battery charger.

FAN FRAME.—The American Blower Company, Detroit, has brought out a new fan frame, which is used with the "Sirocco" "Ventura" fan in kitchens and small houses.

ELECTRIC WELDING.—"Arc Welding in Electric Railway Shops" is the title of a publication, known as leaflet No. 1,824, issued by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., which describes the many advantages of arc welding.

RHEOSTAT.—J. E. Jenkins Company, 59 East Van Buren Street, Chicago, has recently placed on the market the "Jenkins" vernier rheostat, designed for use with radio receiving sets.

MOTOR STARTERS AND CONTROLLERS.—The Cutler-Hammer Manufacturing Company, Milwaukee, has brought out a new standard line of motor starters and controllers for use in office and public buildings, schools, theaters, etc.

ELECTRIC CHAIN HOIST.—The Yale & Towne Manufacturing Company, Stamford, Conn., is distributing an eight-page leaflet covering the "Yale" model 20 electric chain hoist.

RADIO APPARATUS.—The Phoenix Electric Company, Mansfield, Ohio, is distributing a leaflet describing the "Phoenix" radio apparatus.

SMALL MOTORS.—Bulletin No. 203 issued by the Ohio Electric & Controller Company, 5900 Maurice Avenue, Cleveland, describes its alternating-current induction motors and direct-current ball-bearing motors, in sizes from ¼ hp. to ½ hp.

POWER HOE.—The Link-Belt Company, 910 South Michigan Avenue, Chicago has issued book No. 444, in which it describes the "Link-Belt" power hoe (improved drag scraper).

New Incorporations

THE WILLIAMS BATTERY COMPANY has filed articles of incorporation under the laws of the State of Delaware with a capital stock of $3,000,000. The incorporators are A. H. Williams, T. J. Town and J. H. Phillips, Philadelphia. The Capital Trust Company of Delaware is attorney.

THE NEW PROSPECT LIGHT COMPANY, Anderson, S. C., has been incorporated by J. Boyce McClure, L. C. Bolt and H. S. Garrison.

THE HARLEM VALLEY ELECTRIC COMPANY, New York City, has been organized by J. G. Deane, W. Cook (care of Deane & Cook, 15 Park Row, New York) and others. The company is capitalized at $100,000 and proposes to generate and distribute electricity in portions of Dutchess and Putnam Counties.

Construction News

Projects, Plans, Bids and Contracts, Contemplated or Under Way

New England States

MANCHESTER, N. H.—The Manchester Traction, Light & Power Company has been granted a permit to erect an addition to the turbine room and substation at its plant at Kelly's Falls. The cost, which includes a 12,000-kw. turbine and equipment, is estimated at $350,000.

BURLINGTON, VT.—The city Electric Light Department is securing the right of way for the erection of a transmission line from the present terminal on North Avenue to the municipal electric plant.

BEVERLY, MASS.—Plans for the proposed new high school, to cost about $750,000, provide for a vocational department.

WORCESTER, MASS.—Plans are under way by the New England Power Company for the development of an additional 48,000 kw. on the Deerfield River. The plans call for an ultimate development of 128,000 kw.

HARTFORD, CONN.—The Hartford Electric Company is securing the right of way for a high-tension transmission line from South Meadows to Warehouse Point.

NEW BRITAIN, CONN.—A one-story power house will be erected at the new state normal school to cost about $750,000. Guilbert & Betelle, 546 Broad Street, Newark, N. J., are architects.

NEW HAVEN, CONN.—The Fire Department has petitioned the Board of Finance for an appropriation of $50,000 for the installation of a new Gamewell fire-alarm system.

NEW HAVEN, CONN.—Provision has been made in the budget for next year for the installation of 110 additional ornamental lamps on several streets in the city.

NEW LONDON, CONN.—Plans are under consideration by City Manager Barlow for extending the ornamental lighting system into the square at the foot of Chapel Street.

SOUTH MANCHESTER, CONN.—Plans are being prepared by Reeds & Thorpe, engineers, 60 Prospect Street, Hartford, for extensions to the power plant of the J. W. Hale Company.

North Atlantic States

BALDWIN, N. Y.—The Town Board has granted the petition to change the street-lighting system from gas to electricity. The present plans call for the installation of 275 lamps. The Nassau Light & Power Company furnishes electrical service here.

BOMBAY, N. Y.—Shields Brothers will purchase motors and other electrical equipment for their new local plant for the manufacture of Indian goods. J. J. Shields is head.

BROOKLYN, N. Y.—The Brooklyn Edison Company is preparing plans for the construction of a twelve-story service and operating building at Willoughby and Pearl Streets, to cost $1,000,000. McKenzie, Voorhees & Gmelin, 1123 Broadway, New York, are architects.

ELMIRA, N. Y.—Extensions and improvements, to cost about $350,000 are under consideration by the Elmira Water, Light & Railway Company. Bids, it is understood, will soon be asked for equipment for the plant.

HOLLAND, N. Y.—The Public Service Commission has granted the Depew & Lancaster Light & Power Company, Lancaster, permission to supply electricity for lamps, heaters and power in Holland.

JAMESTOWN, N. Y.—Extensions will be made to the power plant in connection with other improvements to be made at the Jamestown Worsted Mills, Inc., including the installation of new pumping machinery, ash-handling equipment, condensers, etc. The cost of the entire work is estimated at about $100,000.

MINEOLA, N. Y.—The Long Island Lighting Company has acquired the property of the Nassau Light & Power Company and will merge the property under its present name. The consolidated company will issue $3,000,000 in bonds and $3,000,000 in capital stock, part of the proceeds to be used for extensions and improvements.

NARROWSBURG, N. Y. — The Public Service Commission has approved a franchise granted by the Town Board of Tusten to Robert B. Huebner, Narrowsburg, to furnish electrical service in that town. Mr. Huebner will also supply electricity in Narrowsburg and vicinity.

NEW YORK, N. Y. — The New York Steam Corporation, 280 Madison Avenue, operating power utilities in the financial district, has issued $1,000,000 in bonds, part of the proceeds to be used for extensions and improvements.

NIAGARA FALLS, N. Y.—The Niagara State Reservation Commission is planning to replace the present stairway at the Cave of the Winds with an elevator or lift, to cost, including all equipment, etc., $80,000. A. T. Clearwater, 280 Wall Street, Kingston, is chairman.

SACKET HARBOR, N. Y.—The Campbell's Point Association has entered into a contract with the Campbell Transmission Company for lighting the resort grounds and buildings. The transmission line will extend from Sacket Harbor to Smithville.

YONKERS, N. Y.—Steps have been taken by the city officials for the removal of the overhead wires on Main Street and in Getty Square.

CAMDEN, N. J.—A one-story power plant will be erected at the new furniture factory of the J. B. Van Sciver Company, Front and Federal Streets. The Ballinger Company, 105 South Twelfth Street, Philadelphia, is architect.

HAMMONTON, N. J.—A portion of the power house and ice-manufacturing plant of the Littlefield Ice & Coal Company was recently destroyed by fire, causing a loss of about $27,000.

MILLBURN, N. J.—The Millburn Electric Company will begin work at once on the erection of a 33,000-volt transmission line to Morristown, to connect with the plant of the Morris & Somerset Company.

ALLENTOWN, PA. — Plans are being considered by the City Council for placing all wires underground in the business section of the city.

CARLISLE, PA. — Contract has been awarded to the Keystone Engineering Company, Lebanon, for the installation of an ornamental lighting system in the business district, to cost $15,000.

FOXBORO, PA. — The Clarion River Power Company has applied to the Federal Power Commission for permission to build three hydro-electric plants on the Clarion River—one to be located near Foxboro, one in the vicinity of Beaver and another near Mill Creek. C. B. Hawley, Munsey Trust Building, Washington, D. C., is in charge.

HARRISBURG, PA. — Application has been made to the Federal Power Commission by Charles E. Schaup, Harrisburg, for a preliminary permit for a water-power development on the Susquehanna River, at Sasafras Island, in York and Dauphin Counties.

JENKINTOWN, PA.—The Philadelphia & Suburban Electric Company will add a fund of $1,500,000 to its recent appropriation of $1,938,760, for extensions and improvements at Jenkintown, Coatesville, Pottstown and Phoenixville.

PHILADELPHIA, PA. — Plans for the proposed twenty-story office building to be erected at Fifteenth and Chestnut Streets for Albert H. Greenfield provide for a power plant. The cost of the building is estimated at $4,000,000.

PITTSBURGH, PA.—The Duquesne Light Company will build three new substations, to cost with equipment about $900,000. One will be located in the Northside district, one at Bellevue, and the other at Wilkinsburg.

WAYNESBORO, PA.—Arrangements are being made by the Waynesboro Electric Company for the installation of an ornamental lighting system in the business district. The plans call for about forty lamps.

EASTON, MD.—Bids will be received by the Easton Utilities Commission until Aug. 17 for extensions to the municipal electric light plant, including erection of addition to power station, the installation of a turbo-generator set, exciter set, switchboard, condenser, cooling tower, etc. Carl J. Kiefer, Fourth National Bank Building, Cincinnati, is consulting engineer.

MONTVALE, VA.—The Montvale-Thaxton Transmission Company, recently organized, contemplates the erection of a 6,600-volt transmission line (13 miles) to connect Thaxton and Montvale, to cost about $9,000.

NORFOLK, VA.—Bids will be received by Charles E. Ashburner, city manager, until Aug. 17 for the construction of an electric substation for use in connection with the municipal terminal, to include substation equipment, underground conduits and street lighting. The Folwell-Ahlskog Company, 600 Seaboard Bank Building, is engineer.

WASHINGTON, D. C.—Bids will be received by the Bureau of Supplies and Accounts, Navy Department, until Aug. 22 for 25,000 fuse covers for use at Iona Island. (Schedule 85.)

North Central States

CADILLAC, MICH.—The City Commission contemplates the construction of a municipal power plant, for which a bond issue is being arranged.

EAST JORDAN, MICH.—Bonds to the amount of $70,000 have been voted for the installation of an electric light and power system.

GRAND RAPIDS, MICH. — Plans are under consideration by the Consumers' Power Company for extensions and improvements to its system, to cost about $1,000,000. The work will include the installation of new steam turbines and auxiliary equipment, underground conduits, etc.

LAKE CITY, MICH.—At a recent election the proposal to purchase the local electric light plant to be owned and operated by the municipality was carried.

PORT HURON, MICH. — The Egyptian Portland Cement Company, Fenton, will install a power house in connection with its proposed new cement mill at Port Huron. The former car works of the Grand Trunk railroad will be remodeled for the plant.

CLEVELAND, OHIO.—Bids will be received by the commissioner of purchases and supplies, City Hall, until Aug. 18 for fiber conduit for division of power and light.

LORAIN, OHIO. — The Lorain County Electric Company is preparing plans for a three-story addition, 40 ft. x 300 ft., at its local power plant, to cost about $300,000.

MUNCIE, IND. — The Indiana General Service Company has issued $3,322,000 in bonds, part of the proceeds to be used for extensions and improvements.

SOUTH BEND, IND.—The Indiana & Michigan Electric Company has petitioned the Federal Power Commission for permission to build a hydro-electric plant at Kings Landing on the St. Joseph River, in Berrien County, Mich., to cost about $1,200,000.

CHICAGO, ILL. — The Commonwealth Edison Company has filed plans for the construction of a six-story power plant, 120 ft. x 280 ft., at One Hundredth Street and the Calumet River, to cost about $1,000,000. The George A. Fuller Company, 140 South Dearborn Street, has the general building contract.

HARRISBURG, ILL.—Surveys have been made by the Central Illinois Public Service Company for the erection of a double-circuit, 66,000-volt tower transmission line from its new power plant at Muddy to West Frankfort. A new sectionalizing switching station will be built at West Frankfort to control the high-tension lines to Muddy, Fenton, Orient Mines, Nos. 1 and 2, Zeigler and Marion. A new switching and transformer station of 21,000 kw. capacity will be erected at Muddy. The equipment of the power station at Muddy will include a 5,000-kva. Allis-Chalmers turbine and three 1,000-hp. Springfield boilers.

MORRIS, ILL.—Plans are under consideration for the installation of an ornamental lighting system on Washington and Liberty Streets, to cost about $14,000. Bids have been received for the work.

OTTAWA, ILL. — Contract has been awarded by the Silica Company for the structural steel work for its proposed new power plant.

MINNEAPOLIS, MINN.—The Northern States Power Company has petitioned the Federal Power Commission for permission to build a hydro-electric plant on St. Croix River, near Kettle Falls.

ST. PAUL, MINN.—The City Council has engaged Adolph F. Meyer, consulting engineer, to make investigations and report on two power sites on the St. Croix River which the city is considering developing.

COUNCIL BLUFFS, IOWA.—The Chicago, Burlington & Quincy Railroad Company, Chicago, will build a one-story power house in connection with its local locomotive shops.

DUBUQUE, IOWA.—The Dubuque Electric Company contemplates the construction of a three-story addition to its power plant, to cost about $300,000.

STORM LAKE, IOWA. — An electric pumping plant will be installed in connection with the municipal waterworks, to cost about $100,000. R. U. Kinne is city clerk.

WATERLOO, IOWA.—The Citizens' Gas & Electric Company, it is understood, will soon call for bids for the construction of a hydro-electric plant, to cost about $100,000. A 500-ft. dam will be built.

BRANSON, MO.—Application has been made by the Empire District Electric Company to the Federal Power Commission for permission to build a hydro-electric plant on White and James Rivers, above Branson. The project will include a transmission line from dam to Joplin. It is proposed to develop from 40,000 hp. to 80,000 hp.

KANSAS CITY, MO.—Improvements are contemplated to the hospital at Leeds Farm, including the installation of electric, ice and refrigerating plants, addition to buildings, etc. It is proposed to submit a proposal to issue from $100,000 to $150,000 in bonds for the work to the voters at the November election.

KANSAS CITY, MO.—The Kansas City Power & Light Company has issued $5,666,000 in capital stock, part of the proceeds to be used for extensions and improvements.

KENNETT, MO.—The Caruthersville & Kennett Electric Light & Power Company is preparing plans for extensions and improvements to its local power plant, to cost about $40,000.

ST. LOUIS, MO.—A company is being organized by C. T. Dana, 1505 Del Norte Avenue, to build a hydro-electric plant on the Black River, to cost about $500,000. Fuller & Beard, Chemical Building, are engineers.

SEDALIA, MO.—The construction of a municipal electric light plant is reported to be under consideration by the City Council.

WATERTOWN, S. D. — At an election held recently bonds to the amount of $225,000 were voted, the proceeds to be used for completing and maintaining the new municipal electric light and power plant.

WHITE RIVER, S. D.—Plans are under consideration for the construction of a hydro-electric plant on Little White River for which bonds have been authorized.

COFFEYVILLE, KAN.—An election will soon be held to submit to the voters the proposal to sell the municipal electric light and power plant to the Kansas Electric Utilities Company.

COLONY, KAN.—The Council has called for bids for extensions and improvements in the municipal power plant. Black & Veatch, Mutual Building, Kansas City, Mo., are consulting engineers.

LYONS, KAN.—The Bevis Salt Company will install two electric turbo-generators and auxiliary equipment, in connection with its proposed evaporating plant, to cost about $175,000.

Southern States

PILOT MOUNTAIN, N. C.—The contract for the municipal power plant and dam on the Ararat River has been awarded to M. E. Jones, Granite Falls. The cost of the system is estimated at $40,000.

PINE TOPS, N. C. — Bids have been asked by the Council for the erection of an electric transmission line from Tarboro to Pine Tops. W. E. Gobb is clerk.

RAY CITY, GA. — The Council has awarded a contract to McGraw & Company, Thomasville, for the construction of an electric lighting system and waterworks.

CITRA, FLA.—The Citra Ice, Light & Development Company is planning to erect an electric plant to furnish electricity in Citra and in Island Grove across Orange Lake as well as power to the packing plant.

QUINCY, FLA.—Bids will be received by the city of Quincy at the office of the city clerk until Aug. 24 for equipment, etc., for water and electric plant, including one "Unaflow" engine directely connected to a 210-kva. two-phase, 2,200-volt generator, one three-panel switchboard, two centrifugal pumps and motors, feed-water pump and heater, motor-driven air compressor, surface condenser and one 200-hp. boiler. The J. B. McCrary Engineering Corporation, Atlanta, Ga., is engineer.

TAMPA, FLA.—Extensions and improvements to be made to the wharf and dock facilities will include the installation of traveling cranes, freight-handling and conveying equipment, etc. The cost of the entire work is estimated at $600,000. A. D. Hall, city manager, is in charge.

VERO, FLA.—At an election to be held on Aug. 18 a proposal to issue $40,000 in bonds for extensions and improvements to the municipal electric light plant will be submitted to the voters.

MEMPHIS, TENN.—The properties of the Memphis Gas & Electric Company will

be sold at public auction Aug. 28 under a federal decree, which fixed $5,385,000 as the minimum price.

CORINTH, MISS. — Arrangements are being made by the City Council for an issue of $100,000 in bonds for the installation of a municipal electric light plant. Fuller & Beard, Chemical Building, St. Louis, are consulting engineers.

PLAQUEMINE, LA.—Bids will be received by F. Wilbert, Mayor, and the Board of Aldermen until Sept. 15 for remodeling the electric light plant and waterworks, to cost about $150,000. Swanson-McGraw, Inc., United Fruit Building, New Orleans, are engineers.

BARNSDALL, OKLA.—The Council is negotiating with the Bigheart Light & Power Company for extensions to the street-lighting system, to cover the entire town.

NOBLE, OKLA.—Bonds to the amount of $11,000 have been voted for the erection of a transmission line to secure electricity for local service.

PAULS VALLEY, OKLA.—The Southern Oklahoma Power Company has acquired the property of the Washita Power & Light Company. Extensions and improvements will be made.

AUSTIN, TEX.—The installation of a 5,000-kw. turbo-generator in the municipal electric light plant is under consideration. The cost is estimated at about $150,000. Walter L. Eyres is chairman of water and light commission.

CORPUS CHRISTI, TEX. — The Gulf Coast Power Company, a subsidiary of the Central Texas Power Company, has been granted a franchise to erect new transmission lines in different part of the county.

CORSICANA, TEX.—The Council is considering the installation of an ornamental street-lighting system in the vicinity of North Tenth Street.

DALLAS, TEX. — The Dallas Power & Light Company has applied to the Public Utilities Commission for permission to build an addition to its generating plant, to cost $2,180,000.

FORT WORTH, TEX.—The City Commission contemplates the installation of an ornamental lighting system on Park Place Drive from Eighth Avenue to Forest Park. Plans are also under way for the installation of a lighting system at Polytechnic, a recently annexed suburb.

FREDERICKSBURG, TEX.—Funds for lighting the Fredericksburg Road from the city limits to the 10-mile post have been raised by the Fredericksburg Road Improvement Club.

TEMPLE, TEX.—The Council has authorized the installation of an ornamental lighting system in the business section of Main Street and Avenue A.

Pacific and Mountain States

MONTESANO, WASH.—The Washington Coast Utilities Company, New York Block, Seattle, has acquired the power plants of the Northwest Electric Light & Power Company at Elma and Montesano. Extensions and improvements will be made to include the erection of a transmission line from Montesano and Elma to Aberdeen, about 12 miles, and a new substation at Montesano.

SEATTLE, WASH. — The Puget Sound Power & Light Company is planning to erect a 110,000-volt transmission line from its hydro-electric plant on Puget Sound to Wenatchee, a distance of about 120 miles, to cost $800,000.

SPOKANE, WASH. — Arrangements are being made by the Washington Water Power Company for the erection of a 60,000-volt transmission line from Lind to Colfax and Pullman. This line will duplicate the service now being given to the Palouse country.

STEVENSON, WASH.—A removable permit has been granted to the Skamania Electric Light & Power Company by the County Commissioners to erect and maintain an electric line along the Columbia River highway from the eastern boundary of Multnomah County to Ellahurst.

YAKIMA, WASH.—The installation of an ornamental lighting system in Yakima is under consideration.

GLENDALE, CAL. — The Council has approved plans for an ornamental street-lighting system on San Fernando Road, from Los Felix Road to Pacific Avenue.

LOS ANGELES, CAL.—Los Angelas Gas & Electric Corporation will make extensions in its plants on Du Commun and Howard Streets, to cost about $58,000.

LOS ANGELES, CAL.—The City Council has adopted ordinances calling for the installation of ornamental lamps on portions of Lucerne and Santa Monica Boulevards. Plans are also being considered to install ornamental lamps on Laveta Terrace.

PORTERVILLE, CAL.—Steps have been taken by the Chamber of Commerce for the installation of an ornamental lighting system on Main Street between Morton and Oliver Streets, to cost about $15,000.

LOS ANGELES, CAL.—The property of the Chandler Shipbuilding Company at San Pedro Harbor has been acquired by the Pacific Coast Borax Company, Kohl Building, San Francisco, to be used as a refinery. The proposed plant will cost about $1,000,000 and will include a power house, machine shop and other buildings. Crushing, mixing, conveying machinery, etc., will be required.

SACRAMENTO, CAL.—Bids will be received by the State Department of Public Works, Division of Architecture, Sacramento, until Aug. 29, for plumbing, heating and ventilating system and electrical work for library, court and office buildings (State Capitol Extension Group). The cost is estimated at $150,000. Weeks & Day, Phelan Building, San Francisco, are architects and engineers.

SAN FRANCISCO, CAL.—The continuation of the "Path of Gold" lamps from Powell Street to Van Ness Avenue is under consideration by the Geary Street Improvement Association.

SHELLEY, IDAHO.—The property of the Shelley Light & Power Company has been purchased by the Utah Power & Light Company. The plant will be connected with the system of the Utah company operating in the Intermountain country.

Canada

CALGARY, ALT.—The Alberta Hydro-Electric Company contemplates building a hydro-electric plant on the Bow River. The project includes four dams, the first of which will cost about $500,000.

FORT WILLIAM, ONT. — Plans have been announced by the Consolidated Water Power & Paper Company, Wisconsin Rapids, Wis., for extensions and improvements to its local property, recently acquired from the Kaministiquita Paper & Pulp Company. The cost of the proposed work is estimated at $1,000,000 and will include doubling the output of the plant and installing a new 100-ton paper mill. The hydro-electric plant, which now has a generating capacity of 1,500 hp., will be increased at once to 10,000 hp. The name of the local company is known as the Thunder Bay Paper Company. George W. Mead, Wisconsin Rapids, Wis., is president and general manager.

NIAGARA FALLS, ONT.—The installation of a new ornamental lighting system on several streets in the North End is under consideration. The plans call for sixty-nine standards, to cost about $24,125.

PETROLEA, ONT. — The Peninsular Sugar Company is receiving bids for the construction of a one-story and two-story plant, 250 ft. by 800 ft., and a one-story power house, 175 ft. by 225 ft., to cost about $1,500,000.

Electrical Patents

Announced by U. S. Patent Office

(Issued July 25, 1922)

1,423,686. ELECTROTINNING; Louis Schulte, Chicago, Ill. App. filed July 12, 1920. Solution of potassium fluoride with a slight excess of hydrofluoric acid.

1,423,734. OSCILLATOR FOR MAGNETOS; H. O. Putt, Elkhart, Ind. App. filed Dec. 9, 1919. Cam engages trigger.

1,423,735. OSCILLATOR FOR MAGNETOS; H. O. Putt, Elkhart, Ind. App. filed Feb. 20, 1922. Novel winding disk.

1,423,737. ART OF TRANSMITTING PICTURES AND THE LIKE; H. K. Sandell, Chicago, Ill. App. filed Sept. 10, 1919. Electromagnetic circuits capable of sending and receiving impulses translatable into pictures.

1,423,738. SHEET PERFORATING MACHINE; H. K. Sandell, Chicago, Ill. App. filed Dec. 6, 1920. Operates with comparatively great rapidity.

1,423,742. HEATER UNIT; H. A. Silverman, New York, N. Y. App. filed May 5, 1921. Particularly for motor-car radiator.

1,423,806. ELECTRIC HEATING DEVICE; W. F. Lebzelter, Elizabethtown, Pa. App. filed Sept. 3, 1921. Simplified means for supporting and supplying current.

1,423,815. ELECTROPLATING PROCESS; N. V. Park, Niles, Mich. App. filed July 6, 1921. Air injecting pipe with a plurality of orifices.

1,423,839. DEVICE FOR AUTOMATICALLY CONTROLLING THE OUTPUT OF ELECTRICAL PLANTS; M. Doloukhanoff, Charlottenburg, Germany. App. filed March 23, 1922. Number of machines increased automatically according to demand.

1,423,889. POWER CABLE REELING MECHANISM FOR SELF-PROPELLED MACHINES; J. S. Townsend, Harvey, Ill. App. filed April 13, 1921. Overhung bearing.

1,423,897. CONNECTOR SWITCH; G. A. Yanochowski, Chicago, Ill. App. filed Aug. 1, 1917. Two-dimension type for telephone exchange.

1,423,898. AUTOMATIC TELEPHONE SYSTEM; G. A. Yanochowski, Chicago, Ill. App. filed June 6, 1918. Records number called.

1,423,899. AUTOMATIC TELEPHONE SYSTEM; G. A. Yanochowski, Chicago, Ill. App. filed July 5, 1918. Simplified circuits, small number of relays, switch contacts and mechanical parts, and novel details of construction.

1,423,911. PORTABLE ELECTRIC LANTERN; A. D. Cardwell, Rockville Center, N. Y. App. filed May 27, 1920. Two lamps of different candlepower and tail-light with novel battery arrangement.

1,423,914. ELECTRICAL ARC WELDING; J. Churchward, New York, N. Y. App. filed Jan. 14, 1920. Employs tungsten electrode that will not contaminate weld.

1,423,924. ADJUSTABLE X-RAY TUBE HOLDER; E. L. Edwards, Indianapolis, Ind. App. filed March 20, 1920. Enables firm support in variety of positions.

1,423,926. VOLTAGE REGULATING SYSTEM; G. Faccioli, Pittsfield, Mass. App. filed Aug. 31, 1921. Gives any desired magnitude and phase at a predetermined point.

1,423,930. TELEPHONE SWITCHBOARD APPARATUS; B. Freile, Bogota, N. J. App. filed Aug. 30, 1920. Compact and convenient arrangement of checking terminals.

1,423,956. TIPLESS INCANDESCENT LAMP AND SIMILAR ARTICLE; L. E. Mitchell and A. J. White, Cleveland, Ohio. App. filed March 20, 1919. Exhaust tube attached to stem tube which carries filament mounting and lead-in wires.

1,423,958. DYNAMO ELECTRIC MACHINE; A. H. Mittag, Schenectady, N. Y. App. filed March 29, 1920. Field windings arranged to operate with more than one number of poles.

1,423,959. FREQUENCY CHANGER; A. H. Mittag, Schenectady, N. Y. App. filed April 29, 1920. Constructed of conventional induction-motor parts.

1,423,985. CEMENTING AND PROTECTING COMPOSITION; L. E. Barringer, Schenectady, N. Y. App. filed Nov. 18, 1919. Shellac, ammonia, sodium, silicate and silex.

1,423,996. ARC BARRIER FOR DYNAMO-ELECTRIC MACHINES; J. L. Burnham, Schenectady, N. Y. App. filed Jan. 7, 1922. Inclined to commutator so as to lift arcs occurring under brushes or between segments.

1,424,003. CONTROL SYSTEM; C. B. Connely, Scotia, N. Y. App. filed Nov. 23, 1921. Electromagnetic switches are prevented from being reclosed until controllers are in off positions.

1,424,016. ELECTRICAL APPARATUS; L. A. Haworth, Dalton, Mass. App. filed Oct. 13, 1920. Improved means of retaining windings in a predetermined relation.

1,424,065. SIGNALING SYSTEM; E. H. Armstrong, Yonkers, N. Y. App. filed June 27, 1921. Obtain enormous amplification of varying currents by modifications of regenerative principle.

1,424,070. AUTOMOBILE DIRECTION INDICATOR; J. B. Blair, Decatur, Ill. App. filed Sept. 20, 1917. Electromagnetically or mechanically operated.

1,424,088. COMPOSITION FOR COATING METALS FOR THE PURPOSE OF PERMITTING ELECTRIC CURRENTS TO OPERATE BY THE ACTION OF LIGHT; H. L. Falk, New Orleans, La. App. filed Dec. 10, 1921. For use in reproduction of sound waves which have previously been photographed.

1,424,091. RADIO ELECTRON; C. R. Fountain, Macon, Ga. App. filed Jan. 21, 1919. Includes a common source of electrons, two control elements, one on either side of this source of electrons, a perforated medium strongly attracting electrons, and another medium capable of liberating electrons under violent electronic impacts.

1,424,141. ELECTRICAL OSCILLATION GENERATOR; L. F. Fuller, Palo Alto, Cal. App. filed June 16, 1919. Involves rugged water-cooled anode tip.

1,424,144. BATTERY COVER; Bert Kunkel, Hart, Mich. App. filed Feb. 11, 1921. Detachably secured and provided with bushings for battery connecting wires.